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ABSTRACT

Primarily a collection of lesson plans covering various topics in geography, this document is divided into seven sections. The first section includes three short papers on geography and its place in the curriculum. The second section deals with teaching map skills, evaluating computer software to be used in teaching geography, and ideas for field trips. Section three contains descriptions of a mountain geography field trip, an urban geography field trip, and a field trip to an agricultural community on the edge of a metropolis. The fourth section contains seven lesson plans for use in elementary grades, most of which focus on map skills. Section five includes 13 lesson plans for junior high school students. The concepts covered include quality of life, air pollution, map skills, water quality problems, and land use. Eleven lesson plans for the high school level are included in the sixth section. Some of the concepts covered are water use and availability, nuclear waste, cultural convergence, environmental problems, and migration. Section seven contains two short articles and a panel discussion on geography and its place in the curriculum. Many of the lesson plans include maps, charts, and graphs. (JB)

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PLACING GEOGRAPHY IN THE CURRICULUM:

Ideas from the Western PLACE Conference

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Edited by A. David Hill

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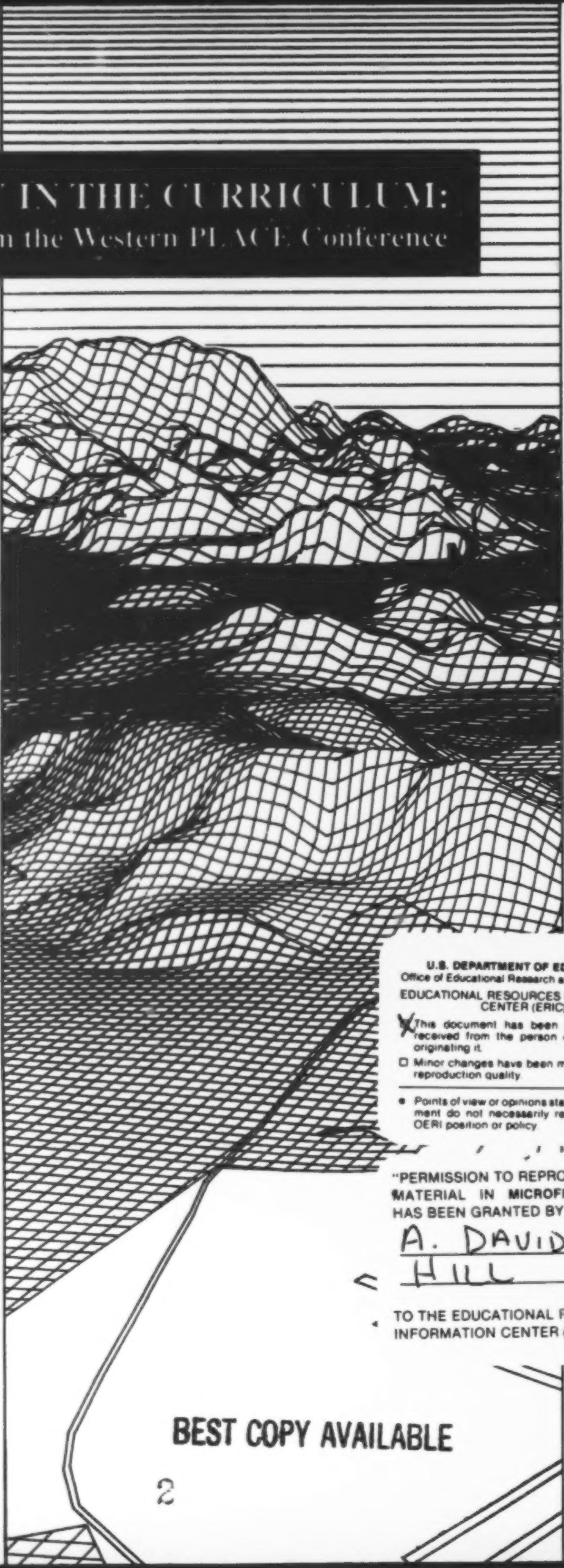

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PLACING GEOGRAPHY IN THE CURRICULUM:
Ideas from the Western PLACE Conference

Edited by A. David Hill
with the assistance of James M. Dunn and Lisa A. LaPrairie

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THE WESTERN PLACE CONFERENCE: TEACHING MODELS FOR THE RENAISSANCE OF GEOGRAPHY

INTRODUCTION

A. David Hill
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Department of Geography
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Boulder

The Western PLACE Conference: Geography in the Elementary and Secondary Curriculum, was held at the University of Colorado in Boulder from August 9 to 11, 1987. Presented by the Colorado Geographic Alliance, the Conference was made possible in part by the support of the National Geographic Society and the Western Governors' Association with supplementary support from the Office of the Chancellor, University of Colorado at Boulder. The Conference attracted 160 people from 22 states and 3 foreign countries. This volume is a collection of ideas from that conference.

One of the things that brought us together in Boulder was the recent national outcry about "geographic illiteracy," and I want to make that my first point. My second point will be that this public concern about geographic illiteracy offers a rare opportunity for the rebirth of a comprehensive and valuable geographic education, one demanding significant content taught creatively. Third, I intend to show that there are already signs of a renaissance in geographic education, and I'll mention some of the early efforts to bring it about. Finally, my way of introducing you to this volume of conference ideas is to suggest that papers and classroom lessons published here and the important linkages among them offer models with which to chart the course for this renaissance.

Geographic Illiteracy

Survey after survey—whether by the media, college professors, or by prestigious national commissions—tell us that many Americans are geographically illiterate. There have been dozens of studies. Three prominent ones were the 1979 study of the National Assessment of Educational Progress, the 1981 Educational Testing Service's Survey of Global Understanding, and the 1983 National Commission on Excellence in Education, which declared us to be A Nation at Risk, partly so because of our geographic ignorance.

Press coverage of a spate of surveys has continued unabated for the last 4 years. These horror-stories must make good newspaper copy because they are so widespread. In 1987, a CBS Affiliates survey of 5,000 high school seniors in seven cities heaped yet more disturbing findings onto the pile. In Dallas, 25% of students tested could not identify the country that borders the United States on the south. In Baltimore, 45% could not correctly respond to the instruction, "On the attached map, shade in the area where the United States is located." In Hartford, 48% could not name three countries in Africa. In Kansas City, 40% could not name three countries in South America. In Atlanta, 42% could not answer the question: "When it is noon in Atlanta, what time is it in San Francisco?"

I think the verdict of "geographic illiteracy" is correct, but why do American students seem to know so little geography? The answer turns out to be rather complex. That students are taught very little geography only raises the question: Why is that? This gets us into the entire curriculum, into teacher education and certification practices, the interests of teachers and administrators and college professors, public wants and needs, and much more. I won't get into all that now. Let me move to my second point about a comprehensive geographic education.

Comprehensive Geographic Education

I must emphasize that locational knowledge, of the kind tested in most of these surveys—for example, find Vietnam on this outline map of the world (incidentally, 95%

of freshman at an Indiana college could not do that)—this level of knowledge is not all there is to geography. Place locations are to geography what the ABCs are to English Literature. Locational knowledge is basic—a starting point—but with only this kind of knowledge one is merely wading up to one's ankles in the deep pool of geography. People with good geographic educations know this. For example, the syndicated columnist James J. Kilpatrick, noting that he "got great chunks of geography" in public school, then went on to say:

> Geography was a wonderful subject. I don't know that we ever got deeply into economic geography, but we learned a good deal about people and places. Some of it was trivial: Name a mountainous country famed for yodeling. Some of it made an impact: Why is the Mississippi muddy, and what does this tell us of soil erosion?

Kilpatrick remembers his geographic education as one that got beyond the questions of "where?" to the deeper questions of "why?" and "how?" and perhaps even to "should?"

All of these questions must be asked if geographic education is to be comprehensive and valuable. There is this popular outcry about inabilities to answer "where?" questions. It is our responsibility as educators to take advantage of this concern and use it to build public support for a truly comprehensive geographic education. By this I mean two things: first, a geographic education that makes connections, connections between the physical and cultural world, connections that bring coherence to, and appreciation for, the world around us. Second, a comprehensive geographic education asks important questions, questions of both fact and values, whether of human cooperation and competition, development and conservation, health and hazard, dignity, justice, freedom, and beauty.

Helping Hands

Having said, in general terms, what kind of geographic education we should strive for, let me move to my third main point, namely, the evidence for a renaissance in geographic education and recent efforts to bring it about. Geography's rebirth can be described as a set of coinciding, if not coordinated, events, ideas, and efforts. There has been no strategic plan or single captain in charge. But there are strong hands on deck helping geography to resurface. Media attention to geographic illiteracy has certainly benefited the cause. This renaissance was well underway before Senator Bradley of New Jersey introduced his Congressional resolution to create a National Geography Awareness Week in November, 1987. Let me mention some other helping hands.

Guidelines

First, we have "the GUIDELINES." The 1984 publication of Guidelines for Geographic Education: Elementary and Secondary Schools has proven to be the most influential document in geography's resurgence. Prepared by a Joint Committee of the National Council for Geographic Education and the Association of American Geographers, 40,000 copies of the GUIDELINES have been circulated thus far. The document's five fundamental themes in geography and its clear learning outcomes for each theme gives solid direction for curriculum development and teacher training. These have been so well received that other disciplines are working to create their own "GUIDELINES."

GENIP

The success of the GUIDELINES contributed to the formation of GENIP, the acronym for "Geographic Education National Implementation Project." Its purpose is to initiate and coordinate activities to help implement the GUIDELINES. GENIP is unprecedented—the first joint project of the four national geographic organizations: National Council for Geographic Education, Association of American Geographers, American Geographical Society, and National Geographic Society. GENIP has already elaborated the GUIDELINES for grades K-6 in the publication entitled K-6 Geography: Themes, Key Ideas, and Learning Opportunities. Another volume of guidelines for grades 7-12 is being developed, and GENIP will also soon publish Suggestions for the Preparation of Elementary and Secondary School Geography Teachers.

National Geographic Society

The National Geographic Society has recently taken the lead in promoting school geography. This, too, is unprecedented. On top of its tremendous success as a purveyor of "popular geography," with its famous yellow magazine and TV Specials, the Society is now pushing hard for geography in our nation's schools. The Society's new GENIP link with the academic geographic organizations has given a gargantuan boost to geographic education. Among the GENIP organizations, NGS has the greatest ability to make large financial commitments and to quickly develop and conduct new programs.

The Society's new Geographic Education Program is now funded through a new Education Foundation, which was established in January, 1988, with an initial $20 million and an additional $20 million in challenge funds. The Program's centerpiece is a new network of Geographic Alliances in 22 states (as of 1988). These Geographic Alliances coordinate classroom teachers, academic geographers, administrators, and other citizens to promote geographic education in the schools of their respective regions. Alliances work at the local level, where educational change in America takes place, through local initiative and cooperation.

The Colorado Geographic Alliance is one of these. In its short life, it has become a locus for new personal relationships and a stimulus for new professional direction and development. It is creating a network of educators who motivate, support, and learn from each other because they want to be knowledgeable and creative teachers of modern geography. Our presenters at the Western PLACE Conference, the authors of this volume, so many of whom are members of the Colorado Alliance, are testimony to this.

The Alliances also nominate the teachers who attend the Society's Summer Institutes in Washington, D.C. The teachers chosen are given a month of in-depth geography instruction and in-service leadership training so they can propel geographic education among their colleagues at home. The Colorado Alliance has sent five teachers to these Institutes in each of the first two summers, 1986 and 1987. The Society is conducting a number of other activities, too numerous to mention here, in demonstration of its commitment to improve the status of geographic education in America.

New Requirements

Other indicators of the rebirth of the subject are the recent additions of geography courses in secondary schools and new geography graduation requirements. Several states including Arizona, California, South Dakota, Tennessee, Texas, and Utah have implemented statewide geography requirements in the past three years. Furthermore, individual school districts are adding elective and required geography courses. It's beginning to look like a "snowballing effect."

The College of Arts and Sciences here at the University of Colorado, Boulder, is the nation's pioneer in stipulating high school geography as one of its freshmen entrance requirements. This will become effective in the fall of 1988.

Conference Organizing Ideas

Let's now turn to my final point, the organizing ideas of this conference. In August, 1986, the first PLACE Conference was held at UCLA to consider geography's newly required role in California's curriculum. PLACE was the acronym UCLA geographer Kit Salter invented for the conference—it stood for People, Location, Attitude, Change, and Environment. Obviously, we borrowed it, with permission, for this second PLACE Conference.

Our Western PLACE Conference offered ideas for charting the course of this renaissance, and the papers and lessons in this volume reflect these ideas. We wanted to share examples of what we mean by "a comprehensive geographic education, one offering significant content taught creatively." To do that, our conference design had several organizing ideas. Let me call them to your attention.

The West.—To begin with, we focused on the Western United States. This drew attention to the fact that geography begins at home. This is where we work and play and study and teach. Furthermore, the West offers so many opportunities for studying important problems with geographic dimensions. These issues link the West to other regions and, indeed, to the entire globe.

Scale.—Social studies teachers know the curricular idea of "expanding horizons"—you begin with things close to home with the young child and move farther afield as the child matures. Similar to expanding horizons, scale is a basic concept in geography. We offered sessions that dealt with issues at local, regional, national, and global scales. However, we did not presume, as does expanding horizons, that the geography closest to home is necessarily the easiest geography.

Inquiry.—Geographic inquiry was one of our prime concerns. Our presenters were chosen to address significant issues, questions, and problems with important geographic dimensions. We wanted to stress that geography offers a unique perspective, one that is necessary in understanding and coping with many issues important to the human condition. And most of us agree that an inquiry approach should be used to teach problem-based subject matter.

Grade Levels.—We planned conference sessions dealing with all grade levels; each time block had something for the elementary, junior, and senior high school.

Exemplary and Modelistic Presentations.—We recognized that our conferees had a variety of needs. Therefore, presenters were asked to stress concepts rather than facts, to make their demonstrations as broadly applicable as possible so as to be useful in many situations.

Joint Presentations.—An invention of this conference were joint presentations by university geographers and secondary teachers. These exemplified, perhaps more than anything, the meaning of a geographic alliance. We intended these sessions to offer conferees not only a better geographic understanding of the problems but also concrete examples of how the problem may be well taught.

Guidelines.—I've mentioned the Guidelines for Geographic Education. Our presenters were asked to use and refer to them, as was appropriate.

Materials.—We wanted to share useful ideas and materials with conferees. Each presenter had handouts. These handouts have provided the material for this edited volume.

Linkages.—Finally, let me mention linkages—a critical element of our Conference plan. Connections between sessions are difficult to make with a conference format, but perhaps the reader of this volume will find them. You are invited to discover them, and when you do they should remind you that geography deals with interrelationships that are readily illustrated in a given local area or region.

To illustrate connections, most of our conferees took one or two of our field trips, which had linkages to our paper sessions, workshops, or plenary addresses. For example, what was learned about Boulder's water supply on the mountain field trip with Lee Klinger and Andrew Marcus connects with issues raised by Tom Huber and Roland Rinne in their paper on water use and availability, and Nick Helburn's and Steve Wanner's paper demonstrates how to develop a deeper understanding of water, the natural resource we in the West fight over the most. From Brainard Lake at 10,000 feet, conferees looked up to Niwot Ridge, which has the world's second longest carbon dioxide data record. Bill Riebsame's and Paula Sinn-Penfold's paper on the greenhouse effect draws out the worldwide implications of increasing levels of CO_2 in the atmosphere. David Greenland and Roger Hudiburg focus on air pollution in the West in their paper.

Spenser Havlick led our urban field trip. He examined the question of how a city manages its resources in trying to assure environmental quality for its people. We probed this urban theme in a number of sessions, for example, by Steve Wanner's focus on urban land use change, and by Fleta Nockel's lessons in electoral geography at county, precinct, and city scales. Peter Frank and Andrew Kirby show how cities act as economic, social, and political entities and how they can be examined within regional, national, and international contexts. These are only a few of the many links between topics you will find in this volume.

Envoi

In these remarks I have suggested that the public concern about geographic illiteracy offers an opportunity we should not pass up. It is an opportunity to help bring about the renaissance of a truly comprehensive geographic education. Many productive efforts are already underway. The Western PLACE Conference and this volume of ideas from that Conference are meant to add to those efforts, to give our own ideas about where we should be going and why we should be going there.

Above all, and finally, I hope you will find that the materials in this volume take a geographic perspective, because this perspective brings coherence to a world of difference. It is a unique perspective, one offering a systematic and sensitive understanding of the world. Our students and our fellow citizens need this perspective. They need it both to help them enjoy this wonderful world of difference and to help them make it a better world. I hope this volume of ideas from the Western PLACE Conference helps you to do the same.

ISSUES IN THE WEST AND THE THEMES OF GEOGRAPHY

INTRODUCTION

Melvin G. Marcus
Department of Geography
Arizona State University

Colleagues, it is a pleasure to share these initial ceremonies for the Western PLACE Conference with you. You will work with skilled and resourceful instructors in the workshop sessions. In the meantime, someone must set the mission. In response, this talk is divided in three parts. Firstly, five major themes in geography should be addressed. Secondly, there will be brief intertwining of those themes with some critical problems common to environment and habitation in the West. Lastly, it will be useful to identify some approaches to the teaching of geography that should apply both as you participate here and as you return to your teaching duties.

Five Themes

As in any discipline, geographers have defined the nature and content of their field in a variety of ways. During this Conference, you will encounter a series of "Fundamental Themes in Geography," which were developed by a joint committee of the National Council for Geographic Education and the Association of American Geographers. These five themes are described in the booklet Guidelines for Geographic Education: Elementary and Secondary Schools that you received before this conference; some may already have had opportunity to peruse them. The themes are listed in Table 1. It is appropriate, as this conference begins, that their context and nature be briefly summarized. Further, as you become familiar with these themes and utilize them here, begin to imprint them for use in the future.

Table 1. Fundamental Themes of Geography

I. LOCATION (Position on Earth)
  A. Absolute
  B. Relative
II. PLACE
  A. Physical Characteristics
  B. Human Characteristics
III. RELATIONSHIPS WITHIN PLACES
  (Humans and Environments)
IV. MOVEMENT
V. REGIONS

The first theme is that of LOCATION—position on the earth. LOCATION may be seen as double-edged: absolute or relative. ABSOLUTE LOCATION defines a place's position in terms of some coordinate system, such as latitude and longitude or the township-range grid, which allows specific geometric placement of point or area on the surface of the earth. RELATIVE LOCATION can be defined in almost an infinite number of ways. For example, relative location can be a cultural perception. I have just returned from Alaska and note that there is a teacher here from that state. It is probable that neither of us, when speaking with Alaskan friends, said: "I'm traveling to Colorado." We might have said "I'm going to the Lower Forty-Eight," but the most likely statement would have been "I'm going Outside." To Alaskans, they are on the Inside and we are on the Outside; that is the essence of their locational world view.

Similarly, we use the generic and relative locational expression "going to Timbuktu and back." It is unlikely that any of us have gone or will go there, but we will continue to use the phrase to express places at great distance or of difficult access. RELATIVE LOCATION also can describe distance from a resource or a market, relationships to land and water bodies, or how much time is involved in travel from one place to another. In any event, the stuff of geography is embedded in this matrix of absolute and relative locations. Ignorance of LOCATION, especially its positional aspects, is the theme most heard in discussions of American geographical illiteracy. I will not pursue that problem here; Professor David Hill has succinctly summarized it in his welcoming remarks to the Conference.

PLACE is the second theme and not to be confused with the name of this Conference, although a play on words is most appropriate. PLACE provides absolute and relative location with physical and human characteristics. Physical characteristics are expressed by the elements and processes of atmosphere, hydrosphere, lithosphere, and biosphere as they occur at any location and as they interact with each other. This is the base material of physical geography and related earth and ecological sciences. Elements and processes can be viewed in a simple singular mode or as an interactive and complex system. The human characteristics can be equally, if not more, complex, because they are the sum of the cultural, political, and economic activities that constitute place. These may include components from language to religion to rent patterns to architecture; the list goes on and on.

Taking human and physical characteristics together, it is possible to describe and identify—and, in the long run, understand and explain—the interactions that occur between people and environment. Further, these characteristics let us appreciate how and why locations are similar or different. Given the range of possible human and physical characteristics, however, it is easily seen how persons who are not geographers often raise the complaint: "Wait a minute now, you have listed just about everything that is identifiable in the environment and claim that all of that is geography, that religion and bedrock are both proper subjects of your discipline." This is a valid argument; modern geography is in danger of being too diffuse in the number of specialties that are presented. The correct response to the criticism, I think, is that these subjects become geographical only when they fall within an integrative and spatial perspective—the point of view that gives life to geography.

PLACE logically leads to the third theme—that human and natural features are interrelated and interactive; that there are RELATIONSHIPS WITHIN PLACES. These relationships help explain the world we live in, but they also focus attention on issues evolved from human use of nature. Look about. Name, for example, four major environmental issues that occupy academic and government researchers from both biophysical and social sciences. The answer is regularly in the news: carbon dioxide, acid rain, toxic waste, and the entire set of problems associated with nuclear energy and nuclear warfare. Each of these issues, which have origins in human activity, is manifested in the West.

There are also problems that reveal nature's impact on human society. For example, the Great Salt Lake has been misbehaving, at least from the perspective of the people who live along or near its shores. Natural processes of precipitation distribution, snowfall and snowmelt, and evapotranspiration have conspired during the past decade to raise lake levels. Recent visitors to Salt Lake City have seen both interstate highways and local roads gone underwater, submerged buildings with only roof-tops showing, drowned agricultural land, and rerouted roads and railroads. Typical of the incessant tampering with environment in which humans indulge to sustain themselves in the face of natural change is the effort to transfer Salt Lake's rising waters to another interior basin. Who knows what consequences that will set off in turn? In any case, it is evident that the interaction between humans and their environment is a two-way street.

This is an appropriate time to introduce a concept that will emerge in several of your lessons during the next two days. It is the concept of Environmental Unity. We all know and express it in one way or another. It may be stated: All the elements and processes of environment are interrelated and interdependent; change in one will lead to change in all others. Retain that message and keep it in the forefront of your thoughts as you deal with interactive environmental systems during these next days. And, please, do not divorce humans from that interactive equation.

MOVEMENT is the fourth geographical theme. It refers to all aspects of interaction between both peoples and places over short and long distances. It includes transportation and communication networks and is much affected by available technologies, social attitudes, and economic conditions. The range of variation of MOVEMENT is great—from Interstate Highways and commuter jet routes to foot travel over trails and open country. A mountain crossing by jet aircraft that requires but few minutes may take days for travelers on foot. These are only a few of the variables that must be considered under the umbrella of MOVEMENT.

Lastly, the fifth theme is REGIONS, a venerable and important tradition in geography. It deals with the visualization and identification of geographical space rationally defined by one or more criteria. There are, for example, climate regions based on precipitation and temperature; cultural regions delineated by language or political or religious affiliation; or complex "overlays" that link human and physical phenomena and processes into meaningful spatial patterns.

As you work with these five themes, you will sometimes find it difficult to separate one from the other. This is because the overlaps and interrelationships between the themes are strong, and it is these connections that help weave the earth's full geographic fabric. It is necessary, therefore, to constantly loop back and forth between the themes to achieve full appreciation of the integrated whole.

Issues In The West

The themes of geography can be universally applied. Human and physical landscapes and their linkages are sometimes complex and understood only with difficulty; in other cases, they are relatively simple. In these respects, we have some advantages in the West. Our world is perhaps easier to define than regions such as the Boston-Washington, D.C. megalopolitan corridor or industrialized Western Europe. In any event, one useful way to express the five themes is through issues that concern us. This method has always had currency in the classroom.

Let's briefly generalize some key factors and issues that demand our attention in the Rocky Mountain West. These are identified in Figure 1. Studying the figure, it is clear that each of the topics identified by the ovals, that pertinent to this part of the world, could as easily be applied to West Africa, Eastern Europe, or anywhere else where there is human habitation. It is easy to discern how the five themes of geography relate to contemporary world or local issues. Indeed, there is little in Figure 1 that did not, in some form, appear in today's Denver Post or Rocky Mountain News. Peruse those papers. There will be reportage and/or discussion of water problems, settlement, land tenure and policy, energy, and economic base. They are all the stuff of daily news.

The small labeled flags attached to the ovals in Figure 1 are examples of factors associated with the larger issues. It would be foolish to look at any of these flags or ovals in isolation. Clearly, they are all interconnected. At the top of the figure, three of the five key themes—LOCATION, PLACE, and REGIONS—form an umbrella encompassing the issues and problems below. The other two themes—RELATIONSHIPS WITHIN PLACES and MOVEMENT—are represented by the lines linking the ovals together.

It is obvious that there is insufficient time to discuss each of these Western regional issues, but recognize that a number of them will be part of your program in the next two days. This brings me back to the point that if we are to enhance geographic education, it must be accomplished in a rational framework. The five-theme idea is not the only approach, but it is an excellent one and provides a basis for program development in elementary and secondary schools. Utilizing current issues provides a meaningful pedagogy to illuminate the five themes.

Exhortations

I would like to conclude with a few exhortations to carry with you during this conference and, I hope, thereafter.

1. Maximize what you take away from this Western PLACE Conference. Excellent instructional materials are available. You will experience a very full few days and evenings. The long hours may be fatiguing, but use them to the full.

2. Follow through and adapt materials and concepts acquired here to your own situation, grade level, school system, or classes. That inevitably means changing your lesson plans and a certain amount of work, but the value of the conference experience is sorely diminished without subsequent implementation.

3. Go into the field with your students. At the least this might require walking out the door and observing the world from the stoop of your school; at best, it suggests field trips and field research. True, there are annoying problems to deal with: permissions, insurance, liability, costs, etc. There are strong arguments, however, that the rewards are worth dealing with the annoyances and extra tasks. Too few students are making the connection between classroom topic and the real world.

Let me relate a story in this regard. Two Ph.D. friends were asked last year to judge at the High School Science Fair for New York City. As you know, New York City has a reputation for its specialized, high-powered science programs and a huge population from which to draw competition. Of the more than 1,200 entries, only six, less than 1%, involved projects that required leaving lab, computer console, or school building. That is a criminal situation. In a society where understanding of environment is so critical, schools and teachers (and, therefore, students) have effectively eliminated field work in geography, ecology, and geology as proper subject matter for our brighter students. There will be heavy penalties down the line.

4. Fourthly see that your students develop a good sense of spatial perception. You may even need to improve your own. We should understand and have a good feel for scale, direction, distance, and dimension. Both adults and children have problems with these components of space, partly because so little time is devoted to developing these skills. It follows that students must learn to use maps, aerial photographs, and remotely-sensed images properly. There is no reason that these materials cannot be introduced in early elementary grades.

5. Don't overlook physical geography. It is not satisfactory to settle for the possibility that your students

have taken an earth science course; the probability is they will not have. Yet the earth's physical geography is critical to understanding the total geographical picture. Many of you are trained in social science or history and I appreciate that it may be more extra work to connect to the physical world, but consideration of physical connections to the social condition is essential.

6. Lastly, remember that these National Geographic Society Alliances are something of a crusade. It is not a crusade for the edification of professional geographers, but rather an attempt dedicated to correcting a serious wrong in our educational system—one that has permitted the loosing upon society, our voting booths, our governing bodies, and our economic system of two generations of the most dismally, geographically ignorant citizens within the community of literate nations. This is a fact of life and not an exaggeration. Losses due to our national geographic naivete have been immense. They show up in resource stewardship, environmental law, economic development, quality of life, and even foreignpolicy. Our record in these arenas can be improved through geographically astute citizenry.

Activities such as this conference may seem small steps in that direction, but they are important steps. These geographic alliances are a starter following a great hiatus in primary and secondary school geographic education. Let me encourage you to not only carry the fruits of this conference into your classrooms, but also to join our small and growing band of crusaders for geography.

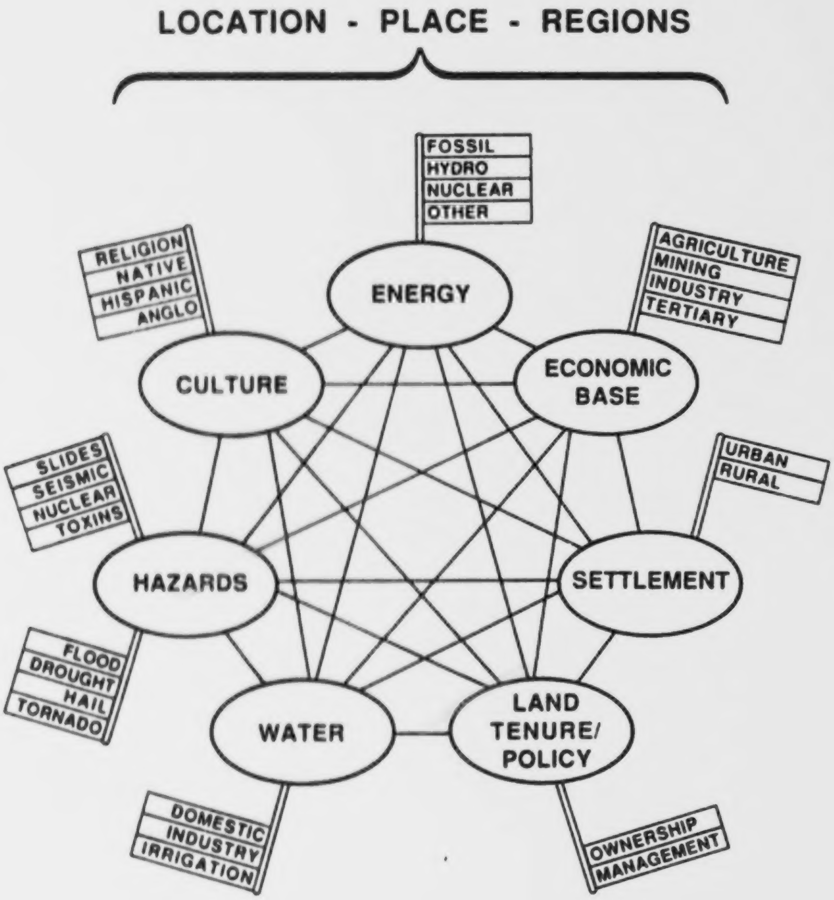
LOCATION - PLACE - REGIONS
FOSSIL
HYDRO
NUCLEAR
OTHER
ENERGY
RELIGION
NATIVE
HISPANIC
ANGLO
CULTURE
AGRICULTURE
MINING
INDUSTRY
TERTIARY
ECONOMIC BASE
SLIDES
SEISMIC
NUCLEAR
TOXINS
HAZARDS
URBAN
RURAL
SETTLEMENT
FLOOD
DROUGHT
HAIL
TORNADO
WATER
DOMESTIC
INDUSTRY
IRRIGATION
LAND TENURE/ POLICY
OWNERSHIP
MANAGEMENT

FIGURE 1

CONNECTIONS: THE WEST IN THE WORLD

INTRODUCTION

William H. Hornby
Senior Editor, The Denver Post

Wallace Stegner, the present dean of our western regional literary fraternity, once wrote that

> If you are any part of an artist, and a lot of people are some part of one, if you have any desire to understand, and thus to help steer, a civilization that seems to have got away from us, then I think you don't try to choose between past and present; you try to find the connections, you try to make the one serve the other.

Most of us here tonight have in common this desire to understand and to help steer our regional, Western American civilization. Otherwise, presumably, we wouldn't be spending our days in education and editing.

I think we also have in common the realization that, when it comes to helping people understand our gleanings, the specialist or scientist in each of us must be complemented by whatever of the artist we can find in ourselves.

It does take artistry—skill in writing, illustrating, or speaking—to make clear the vital connections. It also takes the courage to frame generalizations that some may condemn as platitudinous or speculative.

Patricia Nelson Limerick of the University of Colorado has published a marvelous new book on western American experience titled Legacy of Conquest: The Unbroken Past of American West. I cannot praise it too highly if you are at all interested in a model of skill in communicating the connections of this region from a historian's point of view.

In it she writes "This book has taught me why historians might flee the challenge of synthesis. The genre breeds two alternating fears; that one is only echoing platitudes, and that one has gone out on a limb." Fortunately for us, Dr. Limerick has concluded that "Life out on a limb is the only life worth living."

Out there on a limb with Dr. Limerick is D.W. Meinig, Professor of Geography at Syracuse, whose first of a three-volume series on The Shaping of America is just published. To the layman it is a tremendously impressive attempt to combine the disciplines of geography and history in revealing the connections that shaped our nation.

"Geography and history are not only analogous but complementary and interdependent," Meinig writes, "bound together by the very nature of things. This relationship is implied by such common terms as space and time, area and era, places and events—pairs that are fundamentally inseparable." If they are inseparable, they are connected, and Meinig has set out to make the connections clear.

In an earlier article, which one hopes is a foretaste of his coming volume on the western American experience, Meinig wrote about the "American wests." He laid out a descriptive framework of the several nuclei of human settlement that developed in our region—Hispano New Mexico, the Mormon region, the Oregon country, Colorado, northern California, and southern California. He posits as to how each of these nuclei developed from their origins as isolated settlements into regional systems, then into inter-regional networks, and finally into what he calls inter-metropolitan national networks.

Our purpose here is not to explore Meinig's theory but to note his exhilarating attempt to break new ground in the study of the American west and its connections. An attempt that as he puts it is "...comprehensive as to time and area... developmental with equal concern for past, present, and future, and synthetic in that it seeks a better knowledge of the parts in order to have a better understanding and appreciation of the whole."

Comprehensive—developmental—synthetic—big words that define various aspects of his attempts to get at connections—all of them, over time and space with an emphasis on the whole.

I've noted these two new attempts to make the connections of the West clear because they have been such a fresh impetus to me in my own work. I've been popularizing about the region for thirty years at the Denver Post. I've been concerned with its regional news and opinion. Our early mandate was to make the post a true 'Voice of the Rocky Mountain Empire,' a great regional daily in the tradition of the Atlanta Constitution, which transformed itself into a real voice of the South.

This interest in the region was right down my alley as a consenting adult Westerner—born and raised up in smalltown Montana, educated with the city slickers in California, and thereafter publishing my wares to readers throughout the region. In San Francisco, Sacramento, Great Falls, Livingston, Miles City, Denver, and, I hope to the rural oases in-between.

The time has been spent in a constant attempt to define the "West" and to understand its issues and problems, and then to explain these to the general reader.

The great common denominators of the West in those thirty years—the great subjects that were grist for my editing mill—were aridity, urbanization, population growth, racial and cultural pluralism, international and national dependence, resource extraction and conservation, central geographic location, human mobility and, always, land and space and scenery, and The Western Legend, which was often more comforting than the reality.

All of those labels look so succinct in print. But they were so complex and diffuse in reality as fragments of them emerged in news stories of events that called for context. Aridity: Well, I'd seen a wheat crop fail and the hoppers move in in clouds. Urbanization: You could hardly miss that in 30 years in Denver. Population growth: I only have to think about my first trip to Boulder and my latest. Racial and Cultural Pluralism: Is that the artistry of the Indian potter in Santa Fe or the power and grace of Alex English of the Denver Nuggets basketball team? International Dependence: Did Astor sell his furs in England? Is Portland shipping wheat to Japan? National Dependence: Will they close down the missile factory, or build a reservoir? Resources: Is there any more money for shelter belts, and should we feed the bears in the parks? The chain saw and the combine. Central geographic location: Is it true that Denver will be one of the world's four great ports in the next century?

The two disciplines that could provide the context for these fragments most intelligently, I came to believe as an editor, were history and geography. They were, most often the sources of balanced views. They provided in usable narrative a bringing together of many factors that the more isolated specialties such as economics or political science did not.

There was a constant search by the press for balance, but it is a commodity in short supply out West. Confrontation and competition were our stock. For example, quoting from my current enthusiasm, Dr. Limerick:

> In the second half of the 20th century, every major issue from 'frontier' history reappeared in the courts or in Congress. Struggles over Indian resources and tribal autonomy; troubled relations with Mexico; controversy over the origins of Mormonism; conflicts over water allocation; another farm crisis, a drastic swing downward in the boom/bust cycles of oil, copper, and timber; continuing heavy migration to some parts of the west, with all the familiar problems of adjusting to growth and sorting between natives and newcomers; disputes over the use of the public lands; a determined retreat on federal spending in the West: all these issues were back on the streets and looking for trouble.

Or Meinig writing in 1972:

> Current trends seem to suggest that the West will simply be the western half of a nation of many millions more people, of broadly uniform culture, living some form of urban life within a vast, intimately interconnected, nationwide, multi-metropolitan system. Such a population will be fluid, highly mobile in work, impermanent in residence, capable of almost instant dispersal; the great western mountains and desert landscapes will become mere parks, as accessible and intensely used as city parks of today.

These are examples of scholars willing to go out on a limb with meaningful generalizations about the trends that they see connecting the past they have studied to the present in which they live and to the future about which they care.

The West's international connections—new or old? Define my Hudson Bay trade: migration, cultural clash, war?

We are all of us in our various ways in the business of making the connections of western America clear to the people who live in it and to those who dream about it. If both geographers and historians will be more sympathetic to those of their callings who are willing to take the risks of discovering and articulating those connections, those of us in the business of communicating about them will be very much better off.

As Stegner puts it:

> In the old days in blizzardy weather we used to tie a string of lariats from house to barn so as to make it from shelter to responsibility and back again. With personal, family, and cultural chores to do, I think we had better rig up such a line between past and present.

In our classrooms as in our newsrooms, the more we can string the lines between past and present for our students or our readers, and the more help we can get from geography and history in stringing them, the more we will help people to understand, and thus, to steer.

AN INDUCTIVE APPROACH TO TEACHING MAP SKILLS

SKILLS

"To invent is to understand" (J. Piaget)
"If there are no questions, then there are no answers." (Me!)

How many of us have the courage to design an instructional unit based entirely upon student's questions? Many of us waltz into class with an elaborate set of concepts, facts, and skills that we expect our students to master within a given period, only to be disappointed when they fail to do so. Is it not possible that subject matter would be better learned if students and teachers together designed the curriculum around a set of mutually agreed-upon questions or problems? Learning activities might then be designed to directly address questions or issues of greatest interest and import to students, who would thus be better motivated to pursue solutions. One good question may logically lead to another, but students may be the best judges of what they need to know or learn next.

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While the questions in Figure 1 have been made up and sequentially ordered by me, students asked to design a map skills unit might well ultimately come up with a very similar set, but probably in a variety of different orders. And Figure 2 was generated by a single question from Figure 1, and is by no means exhaustive. My approach to teaching map skills has been inductive since I first discovered 'turf' maps twenty years ago, and it then occurred to me that the best way to teach students how to use maps was to teach them how to make maps. A person who knows how to make maps should be a better map user, more aware of both the rationales that underlie the map making process and the limitations and sources of error in maps.

Figure 1. Twenty Questions About Maps and Mapping

1. Did you bring any maps with you today?
2. What is a map?
3. What are maps used for?
4. What makes maps map-like?
5. What's a symbol?
6. How do you make a map?
7. Where in the world is up?
8. How do you measure maps?
9. How do you make a scale map?
10. How high is this place?
11. Where in the world is this place?
12. How do you find places on maps?
13. How many different kinds of maps are there?
14. What's a topical map?
15. How do you make a topical map?
16. What's a base map?
17. How do you make a base map?
18. What are some good sources for maps?
19. What is an optimal sequence for teaching map skills?
20. What questions do you have about maps?

Figure 2. Twenty Kinds of Maps to Make

1. Turf Maps (sketch maps of favorite remembered spaces)
2. Maps of areas pictured or described in books
3. Small or non-human creature's world (i.e., ant, cat, deer)
4. Future, past, or fantasy map of specific area (i.e., Middle Earth)
5. Sketch maps of states, countries, or regions showing important features
6. Scale maps of small areas (i.e.,rooms, yards, playgrounds)
7. Local area resource maps (i.e., parks, eateries, book stores)
8. Local business or land use sketch maps
9. Photo-maps (adding appropriate elements and place names)
10. Base maps (i.e., with political subdivisions, cities, rivers)
11. Place name maps
12. Outline maps using grid addresses (latitude and longitude)
13. Walking, bicycling, or automobile tour maps
14. Contour maps (two- and three-dimensional)
15. Regional preference maps
16. Location maps (i.e.,special places, areas, routes)
17. Quantitative distribution maps (two- and three-dimensional)
18. Cartograms
19. Choropleth maps (area/ratio/relative class distributions)
20. Invent some more!

Hence, the method recommended is simple yet challenging: to engage students in a dialectical process of asking questions about maps and the processes of making and using maps, and discovering the answers by actively making and using them. The emphasis placed on making maps serves several functions. When students are asked to make a turf map or a sketch map of some known region, they discover both what a wealth of information they possess, but also what lacunae exist in their knowledge of their immediate worlds. Thus equipped, they may be better motivated to learn how maps and mapping can help them to systematically reduce the lacunae and expand their horizons and their competence to explore the world using not only maps, but books, almanacs, personal informants, and their own eyes and feet, to name but a few resources. As noted above, it is also assumed that persons who know how to make maps are more effective map users. Learning to make and use maps provides effective empowerment and may enhance the self-esteem of persons who consider themselves relatively powerless (Anderson 1987).

Is there an optimal sequence for teaching map skills? Winston (1984) and others have provided useful guides, but my own intuition suggests that most of us will learn what we need to know best just at the moment when our personal need or curiosity inspires us to do so. Figure 3 (p.14) is a synthesis derived from Figures 1 and 2 and earlier work (Anderson 1985), but I may wake up tomorrow and decide that a different set and order of activities is better. I would also urge that map skills be integrated throughout the curriculum and not merely confined to the study of geography. One dictum of mine is: "Without space, there is no time; without time, there is no space." Maps are imbued with histories, both natural and social, but they pervade all literature, science, indeed, all of human activity. Maps are power.

In conclusion, I believe that the best a teacher can hope to do is to provide an environment within which students' curiosity is sustained and with resources and activities that facilitate relevant learning. Do we have the trust, the space, the materials to allow self- or small-group-paced learning to occur? These are harder questions that I haven't satisfactorily answered myself. Most of us work within determinant systems which must answer to Caesar. What I am suggesting, however, is that we attempt to enlist the natural curiosity and support of our students in a manner that enables them to determine, at least to some degree, when and how to attain societally mandated learning objectives and hence have a greater feeling of ownership of such goals and greater responsibility for their attainment. What I have just said is not original but represents my own attempt to implement the dictum of Piaget with which I began this piece.

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Anderson, J. 1987. "Using Map Skills to Build Environmental Competence & Self-Esteem" Forthcoming, paper presented to Annual Conference, National Council for Black Studies, Pacific Northwest Region.

Winston, B. 1984. Map and Globe Skills: K-8 Teaching Guide Topics in Geography, No. 7. Macomb, Ill.: National Council for Geographic Education.

Figure 3. Summary Assumptions, Objectives, and Concept and Practice Sequence

Basic Assumptions

1. Students know more than we think they do
2. Making maps teaches uses and limitations
3. Actions speak louder than words
4. Relevance is defined by learners
5. Quality communicates
6. Maps are power

Main Objectives—Students "hooked on" maps will know:

1. Where to find them
2. How to make them
3. How to use them

Suggested Concept and Practice Sequence

Concept

What is a map?

1. Mental maps
2. Conventional Maps
3. Special uses

Map Elements

1. Symbols and legends
2. Orientation
3. Grids and indexes
4. Scale
5. Contours
6. Generalizations
7. Thematic maps

Practical Exercises

1. Brainstorm, analyze images
2. Turf mapping
3. Brainstorm uses and types
4. Question adults
5. Make community maps
6. Take walking tours
7. Find places on maps
8. Make scale map
9. Make contour models
10. Compile outline map
11. Make special purpose maps

Mastery and Review Exercises

1. Revise turf map, using proper elements
2. Design walking tours and treasure hunts
3. Plot features using grid address
4. Measure distances and areas on maps
5. Compile elevation profiles
6. Read special purpose maps
7. Critique published maps
8. Plan local or regional trip

Source: Expanded from Anderson 1985.

USING MAPS AND REMOTE SENSING IMAGERY TO TEACH HIGH SCHOOL GEOGRAPHY

SKILLS

The purpose of this paper is to provide a general picture of how the inquiry method can be used to generate students' interest in using maps as analytical tools.

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Students and teachers alike tend to view maps and remote sensing imagery as a tool useful only for determining the location of features and the general nature of those features. Typical high school classroom map exercises thus tend to emphasize concepts such as determining location (e.g., population densities, vegetation cover, terrain features). Maps and remote sensing imagery can convey a great deal more information, than the simple "what" and "where" of regions. A well-trained map user can also make a number of deductions about the history, economy, culture, and physical geography of a region, as well as reaching a number of conclusions regarding the political persuasion and intent of the map maker.

The purpose of this paper is to provide a general picture of how interpretations about the geography of an area can be made from maps and imagery and how the inquiry method can be used to generate students' interest in using maps as analytical tools. Emphasis will be on using map and imagery interpretation to learn about the human geography of the United States. It is very important that the teacher does not start students at this interpretive level. The concepts presented in this paper require that the student already knows the basics of map reading. These basics should include concepts of absolute and relative location, direction, scale and distance measurement, and different ways of portraying data (e.g., isolines, shading, etc.). Anderson (1986) and Muehrcke (1986) provide good starting points for training students in these basic skills.

The paper concludes with an annotated bibliography of the references that I have found to be the most helpful in teaching both basic map reading skills and interpretation. These references also provide good summaries of possible map and imagery sources and more comprehensive bibliographies on maps and remote sensing. The teacher should be aware that any maps produced by the federal government can be copied without worrying about copyright infringement. You may require publisher's permission, however, to copy maps or imagery from other sources.

Date and Nationality of Settlement

Boundary Systems

Boundary systems, which show up clearly on both maps and remote sensing imagery, are one of the easiest ways to determine quickly the general date of settlement and nationality of early European settlers. Prior to 1785, the Spanish float system, the French long lot system, and the Metes and Bounds system were the primary systems used in North America.

The Spanish float system was primarily used by early Spanish pioneers in the arid and semiarid southwestern United States. Property lines reflected the need of early settlers to have easy access to large stretches of river for their herds of cattle. Because vegetation was relatively sparse, land allotments had to be large to accommodate the cattle. Spanish float boundaries thus tend to follow drainage patterns and encompass large areas of land, often many square kilometers in size (Fig. 1). The large size of Spanish floats means that many of them have been subdivided after 1785, often making them the most difficult boundary system to distinguish on maps and imagery. Besides looking for the boundary outline itself (shown by a long dash and two dots symbol on U.S. Geological Survey topographic maps), you can infer float boundaries from abrupt breaks parallel to rivers in present day property lines combined with a location in the American Southwest (Arizona, California, Colorado, Nevada, New Mexico, Texas). Because these lands were originally granted to settlers by the King or Queen of Spain, floats are often labeled as land grants on U.S. Geological Survey Maps (e.g., the Sedillo Grant in New Mexico).

Rivers were the primary avenue of transport and commerce for the French, so the French long lot system reflects the desire of early settlers to have access to the river. Initial land parcels were thus split up so that surviving relatives each retained river access. The resultant boundaries are a long series of narrow rectangles with the long axis perpendicular to the river (Fig. 1). These boundary systems are concentrated along the Mississippi River (particularly in Louisiana) and the St. Lawrence River. French long lots show up very clearly in imagery, largely because field patterns graphically portray the rectangular pattern.

It is interesting to ask students how the long lot system may have affected settlement and travel. Houses are generally located in lines parallel to the river, with one house on each lot. Later road construction in these areas is almost invariably parallel to the river so that all houses can be reached. Generally, there is a single road paralleling the river on either side. Access roads away from the river are few, because road construction perpendicular to the river essentially destroys all of one person's property (i.e., much of one rectangle must be covered up to build the road) and often must cross marshy terrain. The lack of roads perpendicular to the river makes evacuation along roads during floods extremely difficult and sometimes impossible. More discussion of this topic may be found in Raitz and Hart (1975).

The English metes and bounds system was used throughout the eastern United States. The original thirteen colonies are all subdivided by this system. The metes and bounds system also extends as far west as Ohio, essentially including all lands settled by northern Europeans before 1785.

Metes and bounds surveys used local landmarks to delineate boundaries. A boundary description thus might state that the property line "runs north from the large boulder in the stream bed to the large oak on the hillcrest, then follows the ridge in a southeasterly direction to the stream, and traverses from there along the stream to the point of the beginning." Metes and bounds boundaries tend to be irregular and sometimes even chaotic in appearance (Fig. 1). Later property owners often have difficulties locating original land boundaries with this system, because the landmarks may have moved or no longer exist. Metes and bounds settlement pattern can be seen in property boundaries marked on maps, field patterns, and the completely gridless pattern of roads found in rural areas and many urban settings in the eastern United States.

In 1785, the United States instituted the Public Land Ordinance, which was created in large part by Thomas Jefferson. The Public Land Ordinance is also known as the U.S. Public Land Survey (U.S.P.L.S.) or the township and range system. This system subdivided newly settled lands into a north-south grid of six-by-six mile townships, which in turn were subdivided into 36 one-by-one mile sections (Fig. 2). The township and range system is what created the grid pattern one encounters across the majority of the United States. It is easily defined on U.S. Geological Survey topographic maps, because each section is labeled with a section number (1 through 36). On remote sensing imagery, the U.S.P.L.S. is clearly defined by square road and field patterns. Often sections are subdivided, so that one sees many nested squares and rectangles within the larger one-square-mile sections.

Not all grid patterns necessarily indicate post-1785 development. Use of square or rectangular road patterns was a common practice in urban areas prior to 1785. In these instances, however, the pattern usually has dimensions other than a one-by-one-square-mile grid. Also, if the grid is in one of the original thirteen colonies, then one can rule out use of the Township and Range system. Texas and California have also used grid patterns to outline property that can be confused with the U.S.P.L.S. on imagery. In areas where some confusion is possible, the easiest approach is to use U.S. topographic maps on which townships, ranges and sections are clearly marked.

It is fun to ask students to speculate on problems associated with use of the township and range system. The U.S.P.L.S., for instance, tended to isolate houses on one-square-mile plots in agricultural areas, rather than promoting the growth of centralized towns with surrounding fields as in the east. Services are thus much more difficult to provide in rural regions subdivided by the U.S.P.L.S. because of the dispersed nature of housing. The township and range system has also been indiscriminately applied in some localities, with the grid system and resulting street patterns ignoring topographic constraints imposed by the land. Questions on the topic of how grid systems affect settlement patterns can easily lead to discussions of property boundary controls on schooling, commerce, and basic amenities.

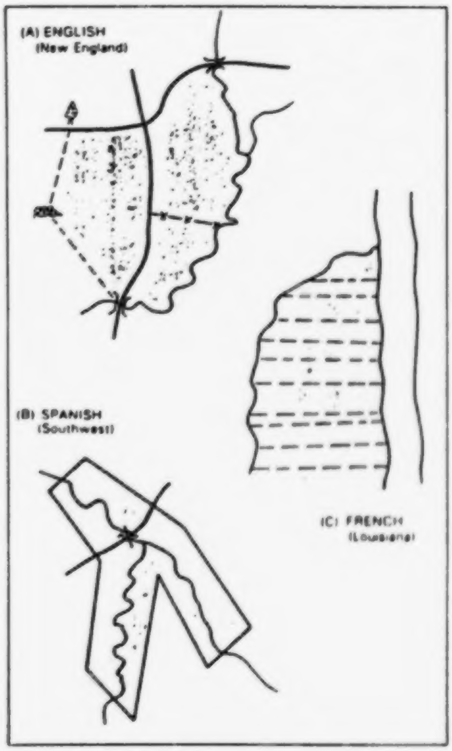
(A) ENGLISH
(New England)
(B) SPANISH
(Southwest)
(C) FRENCH
(Louisiana)

Figure 1. The English metes and bounds (A), the Spanish Float (B), and the French long lot (C) systems of land settlement (from Muehrcke, 1986, p. 193).

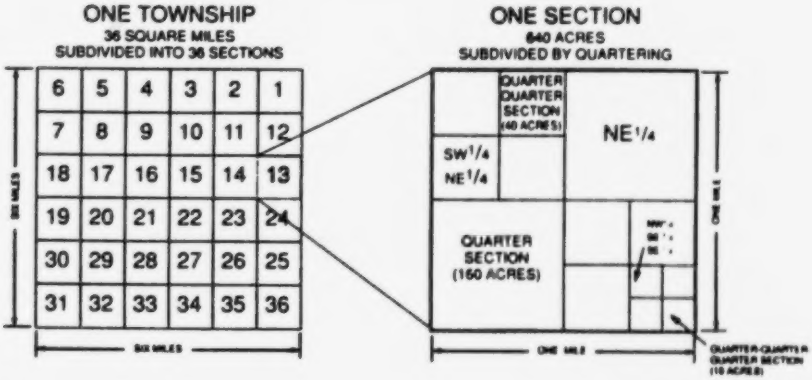
ONE TOWNSHIP
36 SQUARE MILES
SUBDIVIDED INTO 36 SECTIONS
6
5
4
3
2
1
7
8
9
10
11
12
18
17
16
15
14
13
19
20
21
22
23
24
30
29
28
27
26
25
31
32
33
34
35
36
SIX MILES
SIX MILES
ONE SECTION
640 ACRES
SUBDIVIDED BY QUARTERING
QUARTER QUARTER SECTION (40 ACRES)
NE 1/4
SW 1/4
NE 1/4
QUARTER SECTION (160 ACRES)
NW 1/4
SE 1/4
SE 1/4
ONE MILE
ONE MILE
QUARTER-QUARTER QUARTER SECTION (10 ACRES)

Figure 2. The U.S. Public Land Survey system of land division.

Street Patterns

Street patterns often follow property lines and thus are a good indicator of early dates and nationality of settlement. As mentioned above, this is particularly true of the metes and bounds and U.S.P.L.S. systems.

One can also determine more recent dates of settlement from road patterns. Prior to 1940, residential roads in post-1785 residential neighborhoods almost invariably followed a grid pattern. After 1940, developers attempted to add more interest to the landscape by laying down curving roads. After approximately 1960, cul-de-sacs were often used. Like all generalizations, there are a number of exceptions to these statements, but as an overall dating tool for recent development they are fairly effective.

The reader should be aware that some road patterns after 1785 do not follow the U.S.P.L.S. because of obvious topographic or commercial constraints. Denver, for example, was initially settled along a railway that paralleled the South Platte River. Property lines and street patterns in downtown Denver thus run northeast-southeast and northwest-southeast rather than following the north-south orientation of the township and range. As Denver grew eastward away from the river, the city encountered already existing farmlands that had been subdivided using the U.S.P.L.S. The street pattern at this junction thus abruptly shifts from paralleling the river to following the section lines.

The above description of Denver indicates how shifts in street pattern may be used to interpret sequences of settlement and land use. Many areas, for example, exhibit a square mile or quarter mile grid with many curving streets and cul de sacs nested within the grid. It is reasonable in this case to assume that initial settlement was post-1785 and that the land was first used for agricultural fields or pasture, which is why the grid was not further subdivided. The curving streets indicate that residential development probably occurred after 1940. Asking students questions about these types of variations in pattern is an excellent way to get them thinking about how physical and cultural factors have controlled the human landscape.

Trees

Trees can be used on air photo imagery to determine the relative ages of different areas, with larger trees generally indicating older neighborhoods. Blue line photos available from county planning offices are particularly useful for this purpose, because they are cheap (approximately two to three dollars apiece), large (approximately two by two feet), and will show your local area at a large scale (somewhere around 1:4800). Be careful when trying to estimate relative ages using trees that you do not mistake climate controls for age controls. Along the Front Range of Colorado, for example, the increasing precipitation with elevation means that trees grow naturally in the mountains but not in the adjacent prairie grasslands. On the basis of tree height, one might thus assume that houses in the hills were older, when in fact settlement in the plains predated mountain development by a full century.

Place Names

Place names are often a useful map technique for identifying the ethnic makeup of an area. A complete listing of names and associated nationalities is beyond the space limitations of this paper. Clearly, however, names such as St. Patrick are associated with Irish settlement, while San Francisco speaks of Spanish settlement. Schools, churches and street names are often the best places to look for key identifiers of nationality.

One should beware of extending this technique too far, because the ethnic makeup of neighborhoods can change while the names remain constant. A predominance of Irish names, for instance, may indicate original Irish settlement even though very few Irish now live in the area. Various nationalities also borrowed from other languages when their own language did not have an appropriate word for describing a feature. English speaking peoples, for example, did not have good words for arid land features because of the relatively moist nature of their European homelands. They therefore gave Spanish names to these features during their explorations, which can create considerable confusion when trying to use place names to determine the nationality of the first white settlers.

Economic Base and Land Use

A number of maps are available depicting land use patterns at local, statewide, and national scales. Many users of maps and imagery are unaware, however, that with some basic interpretive tools, standard road maps, topographic maps, and air and satellite images can be used to determine local land use and economic bases. The use of maps and imagery in this context provides the student with an ability to visualize and better understand the importance that economic factors play in controlling the pattern of our cities and the ways we order our lives.

Residential Areas

In the urban setting, residential areas are generally characterized by small building sizes relative to industrial and commercial areas. Street size is usually smaller in residential areas. In recently developed neighborhoods, the relatively slow traffic speeds permit tighter curves in streets than those found on major roads. Facilities such as parks, schools, and golf courses are most likely to be in residential neighborhoods. Air photo and remote sensing imagery adds the extra dimension of being able to see foliage, which tends to be found primarily in residential neighborhoods. Specific features on air photos such as driveways, pools, yards and fences are also obvious indicators of residential settlement.

The relative wealth of a neighborhood can often be estimated from building size, lot size, and housing density. Larger lot sizes, larger single unit houses and corresponding lower housing densities generally indicate higher incomes. This set of clues is not useful in high density areas such as Manhattan, where additional factors such as good views of the river and access to amenities such as parks are major controls on housing prices. Regardless of the location, proximity to amenities and disamenities (e.g., sewage treatment plants or junk yards) is a major determinant on neighborhood income. Air photos are useful for using features such as swimming pools, clutter in yards, and landscaping to estimate relative economic wealth.

Commercial and Industrial Areas

Large building size and dense development are typical of business districts. On air photos, giant parking lots are good indicators of commerce in recently developed shopping malls, although downtown shopping regions are often noted for their lack of parking. Distinguishing shopping malls and their accompanying parking lots from large factories with their parking lots can be difficult. Generally, malls will make some effort to landscape their parking lots and will be located closer to residential areas. In downtown areas, service businesses (restaurants, clothing shops, computer stores, etc.) will also often make an effort to enhance the local setting with trees and bushes.

Warehouse districts are distinguished by exceptionally large and simple buildings that are generally rectangular with no attachments (e.g., smokestacks and odd shaped appendages such as blast furnaces). Warehouse districts usually lack any landscaping and have access areas for trucks and/or ship traffic. Manufacturing areas may also have many large buildings, but in addition will include large piles of material like coal, various odd shaped buildings, gas and oil tanks, and parking lots for employees.

The Central Business District can be identified on maps and imagery by the convergence of large numbers of roads and tracks. The Central Business District is also often located at the confluence of rivers. Building density is high and building size is generally large. Frequently major government buildings such as the county court house, town hall or central post office will be located in the Central Business District.

Determining the economic health of business districts from maps and imagery can be difficult. One fun approach is to use sequential maps and photos over a 50-year period to map neighborhood and business growth and decline. The blueline air photos produced by county planning offices are particularly good for determining abandonment or development of buildings, decline or improvement in neighborhood appearance, and change in economic structure through time. A comparison of the Central Business District and an outlying community through time provides an excellent illustration of contemporary problems faced by cities in coping with urban degradation and movement of wealth to suburbs.

Agricultural Areas

Agriculture is perhaps the easiest activity to define on maps and imagery. It is characterized by very large lot sizes with relatively few buildings and a very low street density. Crop patterns are also obvious on air photos and satellite imagery.

Specifying the type of agriculture is a more arduous task. Orchards are the easiest activity to define because they are specifically labeled on U.S. Geological Surveys maps and are easily spotted on air photos by the regular alignment of trees. Pasture can sometimes be distinguished from crop lands on air photos by the presence of grazing animals, stock yards and barns. Distinguishing individual crops from photos is beyond the means of most secondary classes (and air photo interpreters!) as it requires examination of sequential photos through seasonal growth and intensive knowledge of local cropping patterns and their seasonal variations.

The economic health of agricultural areas is essentially impossible to determine from map data. Once again, sequential air photos through time can be used to determine farm abandonment or expansion and changes in farming practices. Difficulties arise in reaching solid conclusions about the economic welfare of agricultural areas, because a highly productive farm can still be losing money.

Exercises in Maps and Remote Sensing Interpretation

The following exercises are a brief introduction to how guided questions can be used to help students use maps and imagery as analytical tools. I have found that students (at least in the beginning stages of map interpretation) require fairly specific questions or they become lost in the detail of the map or imagery. For instance, it is preferable to ask what land partitioning system is used in the area and what that tells you about the data of settlement rather than asking a broader question related to the history of the region.

The exercises shown in this paper are by no means comprehensive. Instead, they are intended to give you a general sense of some of the questions you can ask and problems you can solve using maps. Muehrcke (1986) provides a much more in-depth introduction to the topic. The answers I have provided are also very brief. In a number of cases the answer could generate substantially more discussion.

The maps used in the following exercises are U.S. Geological Survey topographic quadrangles. The exercises emphasize use of maps that are readily available to any user. Because the cheapest air photos are the blueline photos from county planning offices, they are only available locally. You can, however, ask many of the same questions that are asked in the following exercise using local air photos from your region.

Hudson South, New York, 1963, USGS Quadrangle

1. Q: What land partitioning system has been used in this area and how can you tell? A: Metes and bounds, as indicated by the location in New York and the erratic and irregular property boundaries (the dashed red lines).

2. Q: What does this tell you about the probable date of settlement? A: The area was settled prior to 1785 when the U.S. Public Land Survey was initiated.

3. Q: Why are the towns located where they are? A: The towns are located so that they have easy access to water and river transportation, as well as having defensible boundaries (the river) on several sides.

4. Q: What ethnic group or groups initially established these towns? A: British, as suggested by names. St Patricks high school suggests an Irish presence.

5. Q: What clue or clues indicate whether the Hudson River is open for navigation? A: Sunken ships, light houses, navigation beacons and marked water depths on the map all suggest that the river is open to navigation and that it may be a major avenue of commerce in the area.

Pontiac South, Michigan, 1968, USGS Quadrangle

1. Q: This is primarily a residential area. What evidence on the map supports this conclusion? You should be able to come up with at least 5 to 10 reasons. A: Lot size, parks, schools, country clubs, size of houses, vegetation cover, curving streets and cul de sacs, orchards nearby, lake side setting, etc.

2. Q: There is evidence that suggests this is a wealthy or upper class economic neighborhood. List some of the features that support this statement. A: Lot size, house size, country clubs, lake side settings.

3. Q: Main streets appear to follow a rectangular or square pattern, while residential streets are more curvilinear. In general terms, what does this indicate about the history of land use in the area and the dates of this land use? A: The rectangular pattern implies post-1785 but pre-1940 construction. The fact that these large rectangles are not subdivided into smaller squares implies that the areas between the north-south and east-west streets were not developed prior to 1940. Large, unbroken lots of land like this imply that agriculture was the primary activity prior to 1940. Residential development in the area commenced after 1940 as indicated by the curving streets. Areas with cul de sacs were probably developed after 1960.

Donaldsville, Louisiana, 1962, USGS Quadrangle

1. Q: What land partitioning system has been used here? A: French long lot, as indicated by the property boundaries perpendicular to the river.

2. Q: What nationality first settled this region? A: The French.

3. Q: Why are houses concentrated where they are? A: The houses are clustered along a line parallel and adjacent to the river. The proximity to the river reflects the early need to use the river for transportation. The close clustering reflects the continued subdivision of the lots among later generations, with each generation requiring a lot with easy water access.

4. Q: How have the land ownership and housing patterns made the problem of evacuation during a flood much more difficult? A: During a flood, one wishes to evacuate away from the river. Because the houses are clustered along the river, however, the main roads follow right along the river. The roads parallel to the river are the only automobile routes and they will quickly be inundated during a flood, thus stranding people near their houses.

Commerce City, Colorado, 1965, USGS Quadrangle

1. Q: Why do some streets in Denver trend Northwest, while others trend North-South? What does this imply about the relative dates of settlement of the different parts of town? A: The northeast and northwest trending streets are in the oldest part of Denver, which was built up along the railway that paralleled the South Platte River. As the city expanded, it incorporated agricultural areas that had been subdivided using the north-south, east-west trending Public Land Survey system.

2. Q: What do street patterns tell you about the relative ages of Denver, Commerce City and Thornton? A: Denver follows a grid pattern and was therefore established first. Commerce City in large part follows a grid pattern with some curving streets, and was settled after Denver. Thornton consists almost entirely of curving streets and was therefore probably the last city to be developed.

3. Q: If you had only these maps, what would you conclude were the major revenue producing activities in the Denver area? A: Commerce (railroads, airport, freeways), oil and gas, gravel production.

4. Q: Why is there so little development adjacent to the South Platte River? A: Flooding.

5. Q: The U.S. Army and Shell Oil have produced nerve gas, mustard gas, tear gas, explosives, every insecticide known to insects and various other assorted goodies at the Rocky Mountain Arsenal. Examining the map, which cities would you expect to be at the greatest risk from leakage of these materials? Why? A: Dupont and Irondale are at the greatest risk because of the drainage pattern.

Ventura, California, 1955, USGS Quadrangle

1. Q: What group first settled this town? How can you tell? A: The Spanish first settled this city as indicated by the mission, place names and the use of the Spanish float property boundaries. The float boundaries can best be seen where the subsequent one mile square sections abruptly end as they intersect the float.

2. Q: Why is it likely that areas in purple were not settled prior to 1951? Does settlement in these areas imply potential future problems for the city? A: High slopes, mass wasting (i.e. rock falls, slumping soils, etc.) and flooding problems probably made the post-1951 development areas less attractive to early dwellers. Early settlers also wanted easy access to the sea and to roads running along the coast. During flooding and earthquakes, the newly developed areas could be at significantly higher risk than the areas that were settled at an earlier date.

Summary

Far too often, we tend to view maps and remote sensing imagery as rather boring tools used only for documenting where specific features are located. The use of maps and imagery, however, can extend far beyond the level of simple location. Indeed, maps and remote sensing imagery are a valuable tool for documenting and understanding the history, culture and economy of a region. The visual format excites students and entices them to become involved in the inquiry process, as well as helping learn the basic tenets of geography, students can use imagery to explore the environment and better understand the rationale behind the patterns in the world around them.

Useful References: An Annotated Bibliography

Anderson, J. 1986. Teaching Map Skills: An Inductive Approach. Western Illinois University, Macomb, Illinois: National Council for Geographic Education, 31 p. $5.00.
This book starts from square one in teaching basic map skills and then progresses to more sophisticated concepts. Lesson plans and student projects are included.

Curran, H.A., Young II, D.M. Justine, P.S. and Garver, Jr., J.B. 1984. Atlas of Landforms (3rd ed.) New York: John Wiley and Sons. 165 p.
The "Atlas of Landforms" provides visual displays of surface landforms of the earth and other planets using maps, air photos and satellite imagery. Accompanying text helps the reader to interpret the photos and maps. The book is too sophisticated for most high school students, but provides an excellent guide for the teacher on how to use maps and remote sensing imagery to describe and understand earth surface processes.

Kidron, M. and Segal, R. 1984. The New State of the World Atlas. New York: Simon and Schuster. $12.95.
This is a disturbing atlas that highlights the major global problems we face today. It is an excellent book for informing students. It is also unabashedly biased and never fails to generate heated classroom debates. There is also a new lab manual that can be purchased along with the atlas.

Muehrcke, P.C. 1986. Map Use: Reading, Analysis and Interpretation (2nd ed.) Madison, Wisconsin: JP Publications. 512 p.
This is the book I use in my college map classes. It is an exceptional reference for the high school teacher, providing a wealth of information that you can use for lesson plans.

National Geographic Society. 1985. Atlas of North America: Space Age Portrait of a Continent. Washington, D.C.: National Geographic Society. 264 p. $39.95.
I have never encountered a book that generates such immediate interest and enthusiasm among students and teachers alike. The atlas presents a beautiful and striking introduction to North American geography and is a useful tool in showing how remote sensing imagery can be used to understand regional processes.

Raitz, K.D. and Hart, J.F. 1975. Cultural Geography on Topographic Maps. New York: John Wiley and Sons.
This book contains a number of U.S. Geological Survey topographic maps showing a wide variety of cultural features and human adaptations to the physical geography. Because the maps are from the U.S. Geological Survey, you can copy them and distribute them to your class without fear of copyright infringements. Explanatory text accompanies each map.

Thompson, M.M. 1981. Maps for America (2nd ed.) U.S. Geological Survey. 265 p. $15.00.

"Maps for America" is a useful reference book for the teacher. It explains just about everything (and maybe more) that you could ever want to know about the history, uses, and components of maps produced by the U.S. government.

Wilfor, J.N. 1981. The Mapmakers: Alfred A. Knopf. "The Mapmakers" is one of the better histories of surveying and cartography that I have encountered. It is a pleasurable reading and contains a wealth of substantiative and anecdotal information for lesson plans.

Selected Map Sources

Road Maps and City Plans

American Automobile Association
8111 Gatehouse Rd.
Falls Church, VA 22047
(703) 222-6142

David A. Fox Studios
P.O. Box 780
Narberth, PA 19072
(pictorial bird's eye views of U.S. cities)

General Drafting Co., Inc.
Convent Station, NJ 07961
(201) 538-7600
(primarily U.S., some foreign)

The H.M. Gousha Co.
2001 The Alameda
P.O. Box 6227, Dept. C
San Jose, CA 95150
(408) 296-1060

Kummerly & Frey Ltd.
Hallerstrasse 6-10
CH-3001 Bern, Switzerland
(European road maps)

Rand McNally & Co.
P.O. Box 7600
Chicago, IL 60680
(312) 673-9100

Nautical and Aeronautical Charts

U.S. National Ocean Service (NOS)
National Oceanic and Atmospheric Administration
Dept. of Commerce
Rockville, MD 20852
(301) 443-8005

U.S. Defense Mapping Agency Hydrographic/Topographic Center
Dept. of Defense
6500 Brookes Lane
Washington, DC 20315
(202) 227-2534
(foreign nautical, aeronautical, and topographic maps)

United States Topographic Maps

U.S. Geological Survey (USGS)
Dept. of the Interior
Public Inquires Office
12001 Sunrise Valley Dr.
National Center
Reston, VA 22092
(703) 860-6336
(infor. on published maps and books)

National Cartographic Information Center (NCIC)
U.S. Geological Survey
570 National Center
Reston, VA 22092
(703) 860-6045
(infor. on digital data, aerial photo., and other non-USGS publications)

U.S. Geological Survey (USGS)
Map Distribution
Federal Center Bldg. 41
Box 25286
Denver, CO 80225
(303) 236-7477

U.S. Census Maps

U.S. Bureau of the Census
Dept. of Commerce
Data User Services Division
Customer Service
Washington, DC 20233
(301) 763-4100

U.S. National Park and Forest Maps

U.S. National Park Service
Dept. of the Interior
Public Inquiry
Washington, DC 20240
(202) 343-4747

U.S. National Forest Service
Dept. of Agriculture
Information Office
P.O. Box 2417
Washington, DC 20013
(202) 447-3760

U.S. Central Intelligence Agency Maps

National Technical Information Service (NTIS)
5285 Port Royal Rd.
Springfield, VA 22161
(703) 487-4660
(NTIS distributes CIA publications to the general public)

Plastic Raised Relief Maps

Hubbard Scientific Co.
1946 Raymond Dr.
P.O. Box 104
Northbrook, IL 60062
(U.S. only)

Kistler Graphics, Inc.
P.O. Box 5467
Denver, CO 80217
(303) 399-2581

Satellite Imagery

Earth Resources Observation System Data Center (EROS)
Sioux Falls, SD
(605) 594-6507
(sells NASA Landsat products)

Canadian Topographic Maps

Canada Dept. of Energy, Mines & Resources
Canada Map Office
Surveys and Mapping Branch
615 Booth St.
Ottawa, Ont. K1A 0E9 Canada
(613) 998-9900

Miscellaneous Map Sources

Forsyth Travel Library
P.O. Box 2975
9154 W. 57th St.
Shawnee Mission, KS 66201
(distributor of European maps)

Hippocrene Books, Inc.
171 Madison Ave.
New York, NY 10016
(distributor of European maps)

PennWell Publishing Co.
P.O. Box 1260
Tulsa, OK 74101
(energy, geologic maps, etc.)

State Agencies

Consult the National Directory of State Agencies for addresses and telephone numbers of U.S. state agencies such as Chamber of Commerce, Forest and Park Services, Geological Survey, Transportation Dept., etc. State agencies can be excellent sources of maps.

GEOGRAPHY AND COMPUTERS: ASSESSING AND USING SOFTWARE IN GEOGRAPHY CLASSROOMS

SKILLS

This unit addresses the use of software in geography classrooms. It begins with a set of questions that educators can use to judge the usefulness of software in a geography course. This is followed by an abbreviated list of software suppliers and programs. A set of evaluation guidelines are then offered for the instructor who has decided to design a new instructional unit using software. Finally, a classroom exercise is offered that utilizes a software program (One World Countries Database™) to enhance the examination of geographic problems through basic themes of location, place, relationships within places, movement, and region. This participatory unit integrates geographic themes with Bloom's taxonomy on the cognitive domain.

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A Software Analysis

Software in geographic education should attempt to teach fundamental themes in the discipline. It should promote active thinking with responses tapping the range of cognitive skills identified by Bloom and associates (Bloom, B. (ed.) 1956. Taxonomy of Educational Objectives: Handbook One. Cognitive Domain. New York:David McKay). Finally it should include the teaching, testing, and use of specialized skills that geographers use. The questions below can help assess the value of a software product that you may consider using in your classroom (See Figure 1 for software sources).

A. DOES YOUR COMPUTER SOFTWARE address fundamental themes in geography from Guidelines for Geographic in Education. Elementary and Secondary Schools. Washington D.C.: Association of American Geographers and National Council for Geographic Education, 1984?

1. Location: Generate questions that ask for latitude and longitude, neighbors--things in common with neighbors (e.g., precisely where are the world's energy reserves, agricultural belts, main shipping lanes; why should we know where they are--politically, environmentally, economically?)
2. Place: Human and Physical characteristics, observed characteristics, both primary and secondary sources.
3. Relationships Within Places: Cultural and physical relationships including population density, landscape modification, adjustment to natural hazards.
4. Movement: Include questions on transportation and communication (i.e., the movement of products, information, and ideas), migration--domestic and international.

Figure 1. A Sample of Geography-Related Software

Active Learning Systems P.O. Box 1984 Midland Michigan 48640 (517) 835-7051 (802) 423-0818	Hometown: A Local Area Study One World: Countries Database USA Profile: Social and Geographical Database $148 each
Broderbund Software 17 Paul Drive San Rafael, CA 94903-2101 (415) 479-1170	Where in the World is Carmen San Diego? Where in the USA is Carmen San Diego? $39.95 each
Didatech Software Ltd. 3812 William St. Burnaby, B.C. Canada V5C 3H9	CrossCountry Canada CrossCountry USA $49.95 each; lab packs w/10 disks (604) 299-4435 available for $99
Holt, Rinehart and Winston with Bank Street College and Laboratory c/o Robert Ball 5145 W. Lakeridge Rd. Denver, CO 80219 (303) 836-5347	Voyage of the Mimi multimedia package (video, computer simulations, etc.) Prices vary
McGraw-Hill Book Co. c/o Tom Ball 317 West 50th Loveland, CO 80537 (303) 667-9589	Geography Search Geology Search
Tom Snyder Productions Department 101 123 Mt. Auburn St. Cambridge, MA 02138 1-800-342-02	GeoWorld ($79.95 each or $240 for lab pack) The Other Side ($69.95, $210 lab) Decisions, Decisions ($89.95 each or bundled) (Colonization, Immigration, Urbanization)

5. Regions: Areas display unity in terms of selected criteria. Include: sphere of influence, common religions, languages, and types of governments. (Sample questions: What countries are in the same regions according to one set of regional criteria, but have little in common under a different set of criteria? How do these differences pose barriers to economic growth or political stability?)

6. Presenting geographic data, e.g., tables, graphs, maps, charts, oral and written reporting.

B. DOES YOUR COMPUTER SOFTWARE test and encourage cognitive skills including knowledge, comprehension, application, analysis, synthesis, and evaluation?

C. DOES YOUR COMPUTER SOFTWARE test, teach, or promote geographic skills including:

1. Cartography
2. Sketching
3. Measuring
4. Social science information gathering, e.g., questionnaire, observations, and census
5. Natural science information gathering, e.g., Remote sensing and Geographic Information Systems

Evaluation

We suggest contacting publishers for a loan of their products before purchasing them. This gives you the chance to find the right product with minimal expens. After obtaining software and designing a concept for a new teaching unit, it would be helpful to go through an evaluation process to help with the design, to assess the unit's impact on the students, and to put the unit in perspective with other, more general education goals. The outline offered below (from Stufflebeam, D.L. 1969. Evaluation as Enlightenment for Decision Making. In Walcott H. Beatty, Ed., Improving Educational Assessment and An Inventory of Measures of Affective Behavior. Washington D.C.: Association for Supervision and Curriculum Development, NEA. pp. 41-74) attempts to offer a guide for the three-stage evaluation process.

A. Design Stage

1. Consultation
2. Matrix
3. Trial run on sample

B. Implementation (In process evaluation)

1. Observations
2. Product Quality
3. Indirect - e.g., from other peoples' observations
4. Written
5. Engagement between and among students

C. Post Activity

1. Exam feedback
2. Final Product
3. Observation
4. Application to future units
5. Connection to previous units and other disciplines

Using a Database with Other Resources To Teach a Geography Unit

Students use a computerized database to supplement information about how countries depend on other countries to meet economic, social, and physical development needs. This simulation is a modification of an original designed by Bruce Davis, Journal of Geography, Volume 81, 1982, pp. 56-60.

Objectives

1. Understand that countries of the world depend on each other through economic and political relationships

2. Understand the difficult position of industrialized nations that control resources and power over Third World nations

3. Understand the frustration of Third World nations that attempt and often fail to meet their resource needs

4. Students become familiar with computer data retrieval and why this form of retrieval is essential in the modern world

Materials Needed

Software program: One World Countries Database; (be sure it runs on a computer system that your school uses) A copy of "Geopolitics, World Resources, and Survival: a role-playing game," Journal of Geography volume 81 (March-April), pp. 56-60. A current almanac; Database that concentrates on a single country, such as USA Profile, Area handbooks published by the U.S. Government, thematic atlases

such as The New State of The World Atlas. Obtain World Population Data Sheet from the Population Reference Bureau, Inc., 777 14th St. NW, Suite 800, Washington, D.C., 20005 (202) 639-8040.
Overhead projector and transparencies.

Procedure

Follow the steps provided in Davis's article. The class could be divided into 3 teams, each representing a major region, such as African nations, Asian nations, and American nations (north and south). There are many variations on this, but the groups could meet to develop regional or other mutually beneficial strategies to improve trading power. The database One World is used by students to quickly access information about their countries. They can also quickly perform logic searches that would take hours manually. For example, a student could quickly find a list of all countries that import oil and export finished metal products (e.g., Japan) and begin trade negotiations with those countries. As a supplement, a bulletin board or a newsletter (using a newsletter computer program) could be developed complete with trade ads, and U.N. news and developments. After the trading sessions are over, a model United Nations activity would be easy to run, since students would be familiar with many countries (see P.C. Johnson, The Model United Nations: Motivator and Instructional Technique in Geographic Education, Journal of Geography Volume 87, (Jan-Feb) 1988, pp. 13-16.

Students then fill out their own country information page that will be posted in the classroom (Student handout). A system should be developed to allow students equal access to the computer information. The balance of the unit is outlined in the Davis article.

Student Handout

Country: ______________________________
Player's Name: ______________________________
Population (1988 Est.): ______________ Million
GNP/Capita (U.S. $): ______________________________

Major Exports (and Customers):

____
____
____
____

Major Imports (and Suppliers):

____
____
____
____

MORE FIELD TRIP IDEAS

The following field activities can be used to enhance a variety of physical and human geography lessons.

Don Nelson
Centennial Junior High School
Boulder, Colorado

From Helen Ross Russel. Ten Minute Field Trips. Chicago: J. G. Ferguson Pub. Co. 1973:

- During or immediately following a rain, explore the school yard for waterways. In an area free of vegetation, or street gutters there will often be miniature examples illustrating waterfalls, rapids, deltas, canyons, outwash plains, and stream load. What happens to watercourses if they are dammed? How does vegetation influence waterways and erosion?

- Look for evidence of soil-making processes: concrete dissolving under dripping overhangs; rocks breaking up in stone walls, steps, pavement; effects of plant roots and other physical forces.

- Look for influences of wind. What is being moved? What size? Where to?

- Set up a weather station of student made instruments.

- Observe shadows to learn about the sun. With chalk or string outline an object's shadow to observe movement and change in size over time.

- Make a simple sundial by using your flag pole. Have students guess and stake their claims as to where the sun will be at specific times.

From: Association of American Geographers. High School Geography Project - The Local Community: A Handbook for Teachers. New York: The Macmillan Company. 1968:

Objective: To develop skills in geographical observation.

- Why is the town located where it is, and how does the town's location influence its character and size?

- Why is the town laid out as it is, and how does this arrangement affect the way it functions?

- Compare historical maps and photos with the present. Visit those locations to witness and explore reasons for the results of change.

- Explore early train or bus routes in your town to understand terrain.

- If possible, view your town from a vantage point: building top, school roof, hill, etc. and compare with panoramic photos or aerial photos.

MORE FIELD TRIP IDEAS

- Match prominent features and areas in the landscape with their map locations: lakes, rivers, valleys, bluffs, etc.

- Compare the historical role of place with the present role. For example, transportation, resource use, economic activities.

- How do modern buildings compare with historic buildings in regard to human relationships with the environment.

- Distances to places can be measured to better understand spatial concepts. For example, how far is 1/10 of a mile? 2,000 feet? How far can one actually see from a vantage point by using maps to determine distance?

- Have students fill in line maps while in the field.

- Why do businesses or manufacturing areas exist where they do? Physical and economic considerations?

- Where do people concentrate/congregate and why?

- How do new and older housing areas compare? Look at vegetation, lot size, location, house size and design.

- Compare old and new building materials. What are they? Where did they come from?

- Visit a local farm and conduct interviews. How is land use influenced by physical, social and economic factors?

PRAIRIE, PONDEROSA, PTARMIGAN AND PEAKS: A MOUNTAIN GEOGRAPHY FIELDTRIP

FIELDSTUDY

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University of Colorado, Boulder

Today's field trip will take us from the prairie grasslands of the Boulder area at 1600 metres (5400 feet) to the subalpine forests of the Indian Peaks Wilderness at 3000 metres (10000 feet) (Fig. 1). We will make three or four stops along the way depending on how much time we have. Please remember that you will be at higher altitudes where the ultraviolet is more intense, so lather up with sunscreen and wear your sunglasses.

At each stop we will take short hikes to points of interest, where we will provide a brief synopsis of some of the features we are examining. The main point of the trip, however, is to provide you with a sense of how student interest in and understanding of natural processes and the human/land relation can be improved through guided observation in the field. We have found that the greatest value of field trips is not in learning "right" answers, but in stimulating student curiosity and interest in the world around them. Field trips bring comparatively dry classroom facts to life and give them a relevance that no amount of lecturing can do. Unlike classroom situations where the subject matter must often be dealt with abstractly, field trips place the subject matter in full view. This allows students to formulate questions more easily since apparent contradictions can be observed. Thus, this field trip will not be a show-and-tell exercise. Instead, we provide you with short introductions at each stop and then pose some leading questions. We hope these queries will stimulate you to generate your own questions and answers about the processes at work around you.

In most cases, you will probably not have the opportunity to take students on a day-long field trip such as this one. However, you can still accomplish a great deal in just one hour. We have attempted to set up the presentations and questions at each site to give you a sense of what you can do in a limited amount of time.

Stop 1: Settlers Park

Background

Settlers Park provides an excellent view of the break between the Great Plains and Rocky Mountain physiographic provinces. Be sure to watch out for cactus as you hike up to the viewpoint, particularly if you get off trail. Once you reach the viewpoint, Boulder is located to your east, Denver to the southeast, and Rocky Flats (where all the plutonium triggers for the U.S. nuclear arsenal are manufactured) to the south-southeast. You are standing at about 1600 metres (6000 feet) and almost exactly at 40 degrees north latitude. Baseline Road runs directly along the 40th parallel.

Boulder was incorporated in 1861 and was supported primarily by the gold mining in the region. The University of Colorado was founded in 1876 and provided economic stability during the demise of the mining industry. It is still one of the largest employers in the City of Boulder, along with IBM, Storage Technology, Ball Aerospace, and Boulder Valley School District. The population of Boulder is 79,500, which includes the 22,000 students at the University.

Boulder lies on top of the Pierre Shale, a gray mud formation hundreds of metres thick that was laid down when ancestral seas covered the region 100 million years ago. Stratigraphically beneath the Pierre Shale are a series of formations that represent repeated cycles of sea encroachment and retreat (Fig. 2). The Fountain Formation, a conglomerate that was deposited approximately 300 million years ago, makes up the Flatirons and the thin fins of rock above you in Settlers Park.

Overlying the rock units are sediments that have either been washed out of the mountains to the west (primarily during glacial eras) or have cascaded down from the Flatirons and surrounding peaks in massive debris flows. Boulders as large as 2.25 m (7.5 ft) have been found as far as 3.6 km (2.25 miles) from their source areas in the Lyons Sandstone, which is the rock unit immediately to the east of the Flatirons. Weathering of the rocks in the debris flows and dissection by modern streams suggests that the most recent flows occurred around 1850, just before settlement in Boulder (Miller, 1979 and Pendleton, 1978). Clearly, debris flows pose a significant threat to much of western Boulder. It is in large part because of the destructive threat of these flows that the unplanted land in Boulder adjacent to the mountains has been designated as open space that cannot be developed.

The city of Boulder has grown up around Boulder Creek. Although essential as a source of water, the creek and its tributaries pose a large threat to the town if they should flood. The largest flood on record in Boulder occurred in 1894, and had a flow of 11,000 cubic feet per second (cfs). Reconstruction of historic floods indicates that floods as large as 22,000 cfs may have occurred (Bradley and Mears, 1980). In contrast, the flow you are seeing in the creek right now is probably between 50 and 100 cfs. During the flood, the present Pearl Street Mall was the main water way and water depths at the Court House were as high as 12 feet. Present development along the Creek does not always reflect the need to consider flood danger and the issue of flood plain zoning remains a constant point of contention to this day.

A generalized scheme of vegetation classification of the region is presented in Fig. 3. Fires are thought to maintain the grasslands, where species such as western wheatgrass, big bluestem, and buffalo grass resprout readily after burning. Trees in the grasslands, such as the plains cottonwood, are found only along perennial streams. Shrub communities, which provide essential browsing habitat for deer, are common in the foothills and are dominated by mountain mahogany, bitterbrush, and buckbrush. Foothill forests are dominated by Ponderosa pine and Rocky Mountain juniper on the south-facing slopes and by Douglas fir on the north-facing slopes.

Questions

The following questions are typical of those we ask of students in an introductory geography class. A major purpose of the questions is to help students focus on and observe pertinent processes and aspects of the environment, rather than letting them flounder in too much information. Another major purpose of questions is to force students to speculate on why things are the way they are. As such, many of these questions are open-ended without any one right answer. They are meant to generate as many additional questions as answers.

1. Has the position of the Fountain Formation been shifted since it was originally formed? How can you Speculate as to why the Fountain Formation is in its present position.
2. You cannot see the Fountain Formation east of the Flatirons or of Settlers Park. Does this mean that the Fountain Formation was not deposited to the east of this location, or have other processes been at work?
3. Assuming the beds have not been overturned, how can you tell which beds are the oldest?
4. Were these beds initially laid down by air, water or volcanic processes? What clues lead you to this conclusion?
5. Why are the rocks of the Fountain Formation exposed, while other rocks are not? In the exposed rocks at Settlers Park, which layers are eroding most rapidly? Why?
6. Why is there such a marked difference in forest density between north and south facing slopes?
7. Notice how the Ponderosa pines cluster along ridge lines. Why might this be?
8. How many different major ecosystems can you delineate? What seems to be the major factor or factors controlling where they are located?
9. How have humans altered this landscape? Think in terms of atmosphere, biosphere, hydrosphere, etc.
10. Boundary regions between ecosystems (ecotones), such as the boundary between the plains grassland and foothills forest that you can observe here, are areas in which wildlife is particularly abundant. Why?

Stop 2: Comforter Burn

Background

Our second stop is at the Comforter Mountain burn in Boulder Canyon. This fire burned 104 hectares (257 acres) between an elevation of 2,379 to 2,532 metres (7,805 to 8,307 feet) in June of 1976. Research by two members of the Department of Geography at the University of Colorado has shown that erosion rates from the burn site were accelerated by as much as three orders of magnitude in the year immediately following the burn (Morris and Moses, 1987). Four years later, erosion rates were only an order of magnitude greater than those in an undisturbed forest site. The results of this study indicate that fire disturbance may account for a large portion of the present erosion occurring in the Front Range.

Prior to the fire, Comforter Mountain contained extensive stands of Ponderosa pine that had been killed by a severe pine beetle attack. Ignited by a careless camper's fire, this fire burned intensively due to the abundant fuel, drought conditions, and high winds. The heat from the fire caused rocks to crack and flake. Other than a few trees protected by rock outcrops, not a single bit of vegetation remained. The entire area was reduced to ashes. During the first thunderstorm following the fire, the ash eroding off the fire site turned Boulder Creek black as oil.

As you can see the vegetation has responded well and tree seedlings are finally beginning to be established. Aspen, a fire species, is reproducing vegetatively through root suckering. In the montane region, Aspen forests eventually give way to Ponderosa pine and Douglas fir forests, which can be seen in the adjacent unburned areas. Note, however, the severe budworm infestation affecting Douglas fir on the opposite side of the valley. Fire is the natural control of these insects and it may be that human prevention of fire has allowed insect infestations to cover more extensive areas than they would if fires were not controlled.

The Comforter Mountain burn site lies in the core of the Front Range, which is primarily made up of granites, schists and gneisses of Precambrian age (older than 540 million years). These igneous and metamorphic rocks were once planed away to a relatively level surface, as evidenced by the flat tops of Longs Peak, Mt. Evans, and Pikes Peak. This level surface still exists below the sedimentary rocks of the Great Plains to the east (Chronic and Chronic, 1972). Both the sedimentary and crystalline rocks were uplifted in the Laramide Orogeny that formed the present Rocky Mountains about 50 million years ago. Like most ranges in the Rocky Mountains, the Front Range was initially formed as a broad, faulted anticlinal uplift from which the sedimentary layers were subsequently eroded (Fig. 4).

The burn site is very close to Gold Hill, which was the scene of one of the earliest gold strikes in Colorado in 1858. In 1869, the Caribou and Poorman mines near Nederland were discovered, with finds in the Ward region occurring shortly thereafter. After leaving the Comforter Burn, we will drive up through Nederland and then return via Ward, so you will have a chance to see some of the ways in which mining has affected the landscape. In total, about 25 million dollars of gold has been taken out of Boulder county mines. Today, only one gold mine near Ward is commercially active, although hundreds of amateur miners continue to search the hills and pan the streams in hopes of striking paydirt.

In 1900, tungsten was discovered extending along a nine-mile line from Nederland to the northeast. During the early 1900's, Boulder County was the nation's largest tungsten producer, generating approximately 23 million dollars worth of the precious metal. Silver and lead have also been mined from the region, although in lesser quantities.

Questions

1. Look closely at the bedrock in the region? What clues indicate that it had its origin as a cooling magma rather than as sediments laid down by water as at the first stop?
2. Speculate as to why erosion rates would be so much greater immediately following the burn.
3. Why does the hillslope to the west have very little tree cover, while the slope to the east is more densely wooded?
4. Why is the forest density so much greater than at our first stop?
5. Why does the vast majority of erosion occur during the summer months?
6. What process has created the level area along the edge of the stream? Does this have any implications for construction in this area?
7. Why is there a greater diversity of vegetation along the creek?
8. How might you estimate the maximum size of flood that has moved through the creek at this location? Can you be sure that this is the maximum flood? Why or why not?
9. Notice all the sharp seeds (beggar's tick, bromegrass) stuck in your socks and how you have pulled them out and thrown them away? Why do you suppose they are the first plants to dominate after the fire?
10. If fire control has caused more extensive forest insect outbreaks (and thus more destructive fires and more severe erosion afterwards) should we control fires or not?

Stop 3: Brainard Lake

Background

Brainard Lake is located in the Indian Peaks Wilderness, the most visited "wilderness" area in the United States. These lakes are an important part of the water supply for Boulder and Longmont and their level fluctuates wildly in the winter when the lowland cities remove their water. Lake levels remain fairly constant during the summer, in large part to avoid alienating the many forest users. Remember, you are now at 3100 metres (10,350 feet), so be sure you have a good layer of sun screen protecting you.

The climate here is similar to what you might find in northern Canada. This continental climate is characterized by seasonal temperature extremes (summer maximum around 80 ; winter minimum around -40). Winds are quite strong from the west and can average over 50 mph on some winter days. Climate is an important factor controlling treeline. Regional treeline averages about 3500 metres (11,500 feet) and appears to be controlled by average growing season temperature, whereas more local treeline patterns are the result of winds.

Here in the subalpine ecosystem, forests are dominated by Engelmann spruce and Subalpine fir. Lodgepole pine and Limber pine are the main fire species, although fires burn rather infrequently in these moist, high-elevation forests. Level areas adjacent to lakes and streams support bog vegetation dominated by willows, bog birch, and mosses, particularly Sphagnum. It has long been thought that bog vegetation develops through the infilling of open water bodies and that forests eventually invade the bogs. However, evidence is now being found that indicates that mosses kill trees, and through this process allow bogs to replace forests. In fact, studies throughout the world have found abundant buried wood beneath bogs rather than lake sediments. These findings suggest that, in many regions, a forest left undisturbed will not remain a forest but will develop into a bog given enough time. If forests are climax vegetation representing mature communities, then bogs may represent old-age, or anti-climax communities, which are culminated by ice ages.

Glacial Landforms

The landscape you are looking at was molded almost entirely by glacial action. Glaciers on the east slope of the Front Range were valley glaciers 12 to 20 km long, 1.5 to 3.0 km wide, and as much as 180 to 350 m thick. Glaciers of this size were able to affect landforms over a much larger area than just the Brainard Lake region. Many of the sediments underlying Boulder and other areas east of the Front Range were derived from glacial erosion. As we drove up through Nederland and past Ward, we also crossed several different sets of glacial moraines and tills (Fig. 5).

The evidence you will see of glaciation consists of both erosional and depositional landforms. Erosional evidence of glaciation that you should be on the lookout for include aretes, cirques, and U-shaped valleys (Fig. 6). Other erosional features such as tarns, glacial striae, and rock steps are located farther up valley and cannot be seen from Brainard Lake.

A key depositional feature to look for is glacial till, which is the jumbled unsorted debris deposited beneath or along the sides of a glacier as it moves along (Fig. 7). Glacier till makes up much of the valley bottom material in the Brainard Lake area. When till is pushed up in front of or along the side of a glacier it is called a moraine. Red Rock Lake, approximately a mile east of Brainard Lake, is held in place by a moraine that has formed a dam. Moraines and tills can often be recognized because they contain material of all sizes, from clays to giant boulders. You may also see glacial erratics, which are individual boulders left behind in a seemingly random pattern as the glacier recedes.

Obviously the best indicator of whether an area has been glaciated is the presence of glaciers. In the case of the Front Range, however, it is difficult to distinguish the small glaciers you find from permanent snowfields. The characteristic distinguishing glaciers from snowfields is that glaciers are in motion, so look for evidence of flow to determine if you are seeing a glacier or not. Several clues are indicative of flow, including crevasses, flow lines, and moraines.

Remember, there are also many other landforms associated with near-glacial (periglacial) environments, that are not the direct result of glaciation. Periglacial features that you can see from Brainard Lake include talus, rock falls, and permanent snowfields. Be on the lookout for these features as well.

Glacial Dating

Evidence remains from three major glaciations in the Front Range: (1) the pre-Bull Lake glaciation, prior to 150,000 years before present (B.P.); (2) the Bull Lake glaciation, approximately 100,000 years B.P.; and (3) the Pinedale glaciation, approximately 30,000 to 10,000 years B.P. All evidence from any earlier glaciations has been destroyed by erosion. In the past 5000 years, there have also been several minor advances during Neoglacial time. The most recent cold spell was known as the Little Ice Age and occurred in the 1700's when glaciers in the Front Range advanced several hundred metres. In the Brainard Lake area, almost all the deposits are from the Pinedale glaciation.

The timing of different glaciations can be determined by both relative dating and absolute dating. Relative dating expresses the timing of an event in terms of whether it occurred before or after another event e.g., this moraine is younger than the moraine farther down valley. Absolute dating provides a date for an event, e.g., 1200 A.D.

Several techniques can be used to determine the relative dates of glacial events. Perhaps the most important technique is based on the principle of superposition. Just as older rocks in a sedimentary formation are located below younger rocks, so are older glacial deposits usually located down valley of more recent deposits (you figure out why this is the case). Other relative dating techniques are less certain, but still useful. Degree of revegetation can indicate how recently an area was glaciated, but one must be careful not to confuse the effects of elevation (vegetation generally grows more slowly at altitude) with those of time since glaciation. The depth of soil development can also be used to determine the relative age of glacial deposits, but again, one must not confuse time controls on soil profiles with the effects of topography, climate, and vegetation. Sediment depths in glacial lakes may indicate how recently an area was glaciated (more recently glaciated and eroded lakes would presumably have less sediment), but factors other than time since glaciation can affect sediment depths. Thickness of weathering rinds and even fossils can also be used as indicators of relative age.

The best known absolute dating technique is Carbon 14 (C14), which provides an age by comparing the ratio of C14 to C12 in organic matter. Counting of tree rings can provide a minimum age since glaciation (i.e., the area has been deglaciated for at least as long as the tree has been alive). A minimum age can also be calculated by counting varves, which are layers of sediment deposited in glacial lakes on a seasonal basis. Less precise dates can by supplied by using pollen ratios (e.g., ratio of pine to spruce pollen) in sediments, which have been correlated by scientists to certain dates that correspond to different climate regimes. Pollen ratios can be easily confusing, because local short term variations in wind may lead to big variations in pollen ratios that are falsely interpreted as being due to climate changes. The size of lichen colonies on rocks may also be used for dating of deposits, with larger colonies indicating a longer period since glaciers were present. By correlating the size of colonies with time (maybe by using colonies on cemetery headstones), one can also use the lichens for absolute dating. The best technique of all, however, for dating glacial advances and retreats is human observation. Unfortunately, since Neanderthals and Native Americans did not keep detailed notes of glacial chronologies, this technique only helps us in dating events in the Front Range over the past 100 years.

Questions

1. Why are branches growing on only one side of the tree in some places?
2. Near the Roosevelt National Forest Pawnee Campground sign notice how trees and shrubs grow together in stripes? Why do they do this and why are the stripes located where they are?
3. How can you distinguish the glacial deposits on which you are standing from stream deposits?
4. Note the tree covered ridge that crosses the valley to the west of you. It is not a bedrock ridge. What is it and what formed it?
5. Why is the tree line located where it is? Why is it so irregular?
6. Are the rocks making up the Indian Peaks sedimentary or igneous-metamorphic? How can you tell?
7. What is the primary force moving material in this environment (think in terms of wind, water, gravity, ice, etc.)? Is this always the dominant force?
8. How might you determine the last time at which Brainard Lake was glaciated?
9. Is the tree-covered moraine that blocks the valley to your west older or younger than the moraine that dams Red Rock Lake? What is your evidence?

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Figure 1. Field trip route.

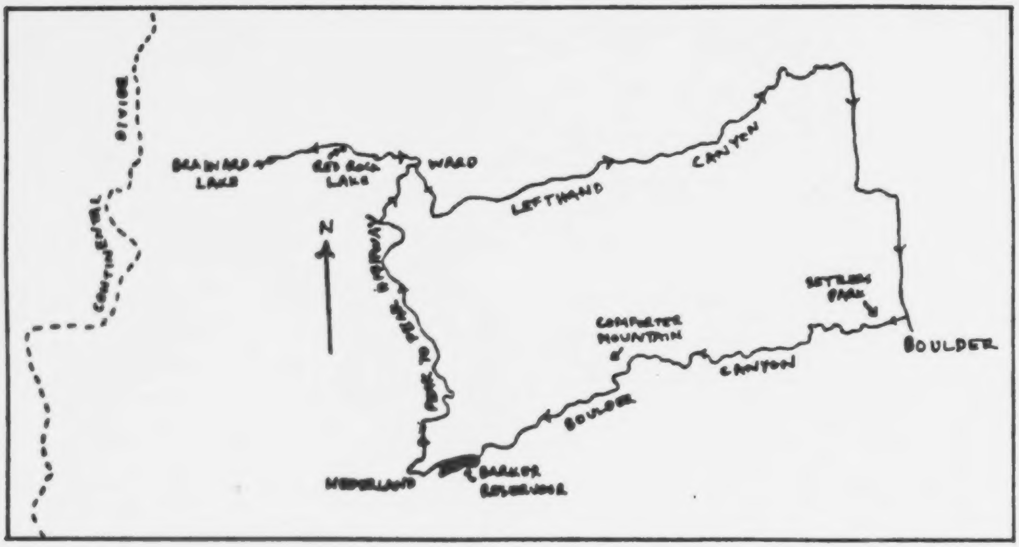

CONTINENTAL DIVIDE
BRAINARD LAKE
RED ROCK LAKE
WARD
LEFTHAND CANYON
N
PEAK TO PEAK HIGHWAY
COMFORTER MOUNTAIN
BOULDER CANYON
BOULDER
NEDERLAND
BARKER RESERVOIR

Figure 2. Generalized east-west geologic cross section across the Boulder area. The thicknesses are not to scale and the vertical scale is exaggerated for emphasis.

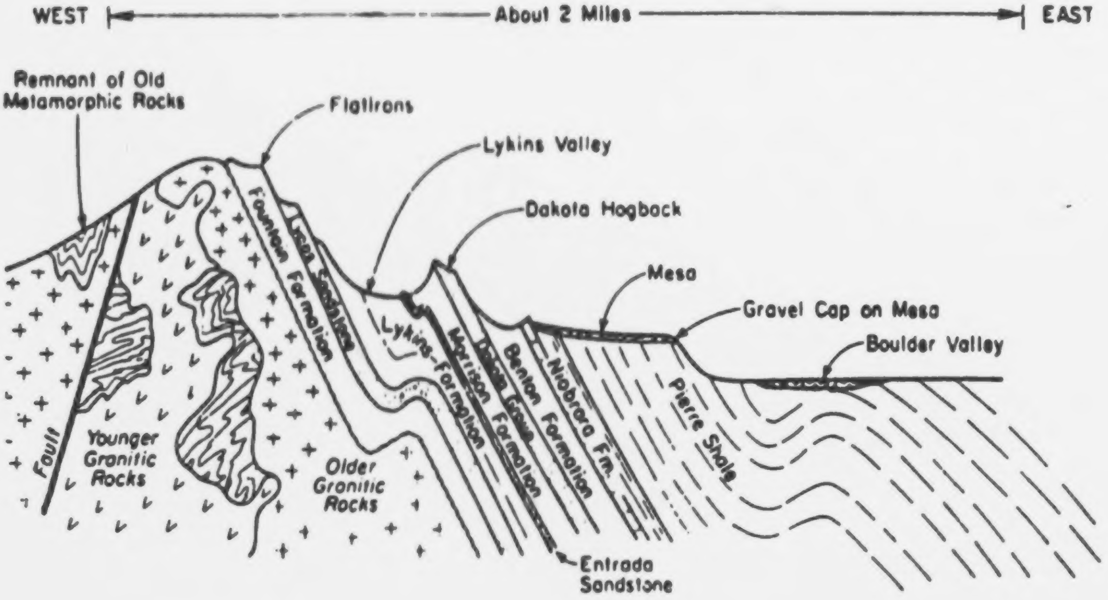
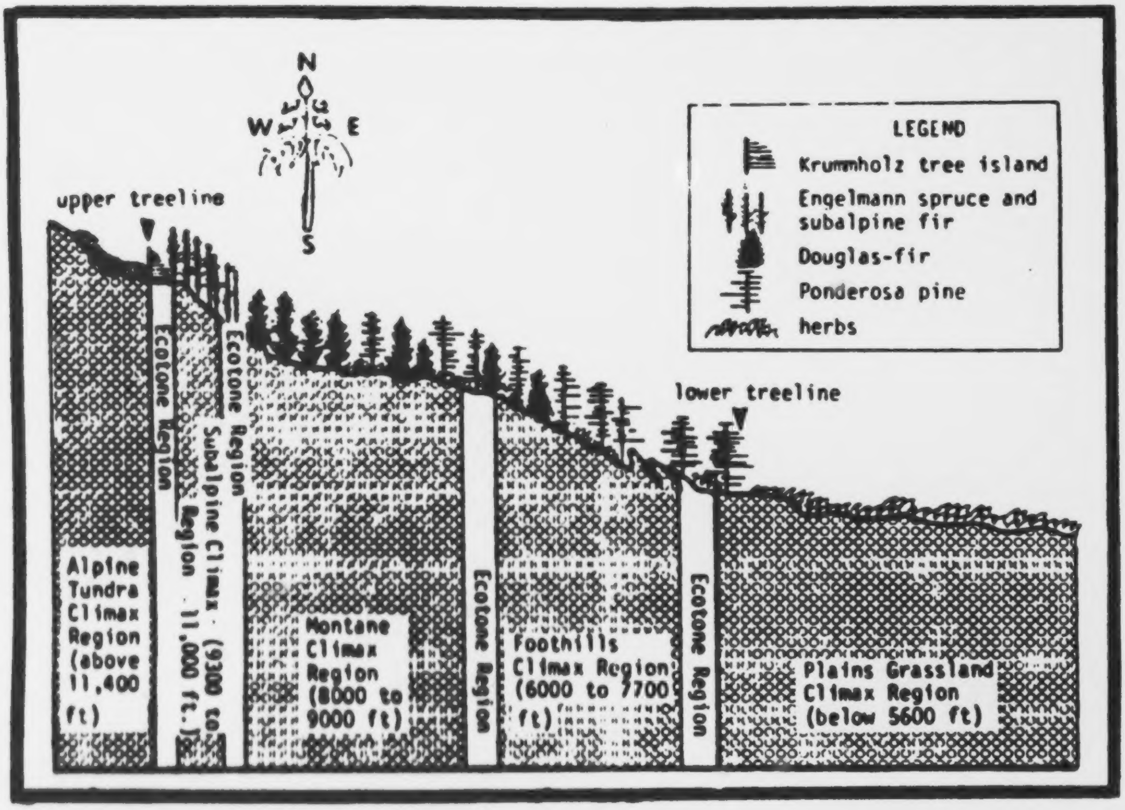

WEST
About 2 Miles
EAST
Remnant of Old Metamorphic Rocks
Flatirons
Lykins Valley
Dakota Hogback
Mesa
Gravel Cap on Mesa
Boulder Valley
Fault
Younger Granitic Rocks
Older Granitic Rocks
Fountain Formation
Lyons Sandstone
Lykins Formation
Morrison Formation
Dakota Group
Benton Formation
Niobrara Fm.
Pierre Shale
Entrada Sandstone

Figure 3. Vegetational transect of Boulder County.


N
W
E
S
upper treeline
LEGEND
Krummholz tree island
Engelmann spruce and subalpine fir
Douglas-fir
Ponderosa pine
herbs
lower treeline
Alpine Tundra Climax Region (above 11,400 ft)
Ecotone Region
Subalpine Climax Region (9300 to 11,000 ft.)
Ecotone Region
Montane Climax Region (8000 to 9000 ft)
Ecotone Region
Foothills Climax Region (6000 to 7700 ft)
Ecotone Region
Plains Grassland Climax Region (below 5600 ft)

(Adapted from Marr, 1967; foothills refers to Marr's Lower Montane, and Montane refers to Marr's Upper Montane Climax Region.)

Figure 4. East-west transect across the Rocky Mountains showing the estimated location of the original surface of the anticline. The sedimentary layers have since eroded away.

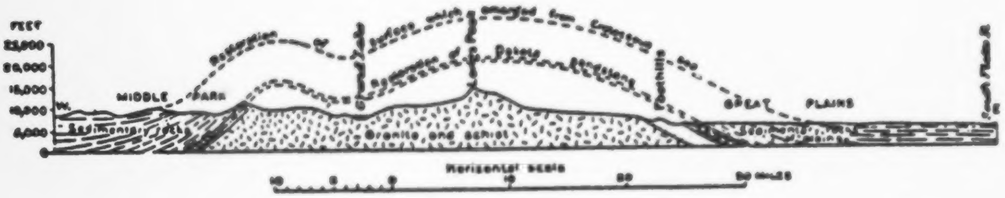

FEET
20,000
15,000
10,000
5,000
W.
MIDDLE PARK
Granite and schist
Sedimentary rocks
Foothills
GREAT PLAINS
E
Horizontal scale
10
5
0
10
20
30 miles

Figure 5. Areal extent of Pleistocene glaciation in Boulder Creek watershed.

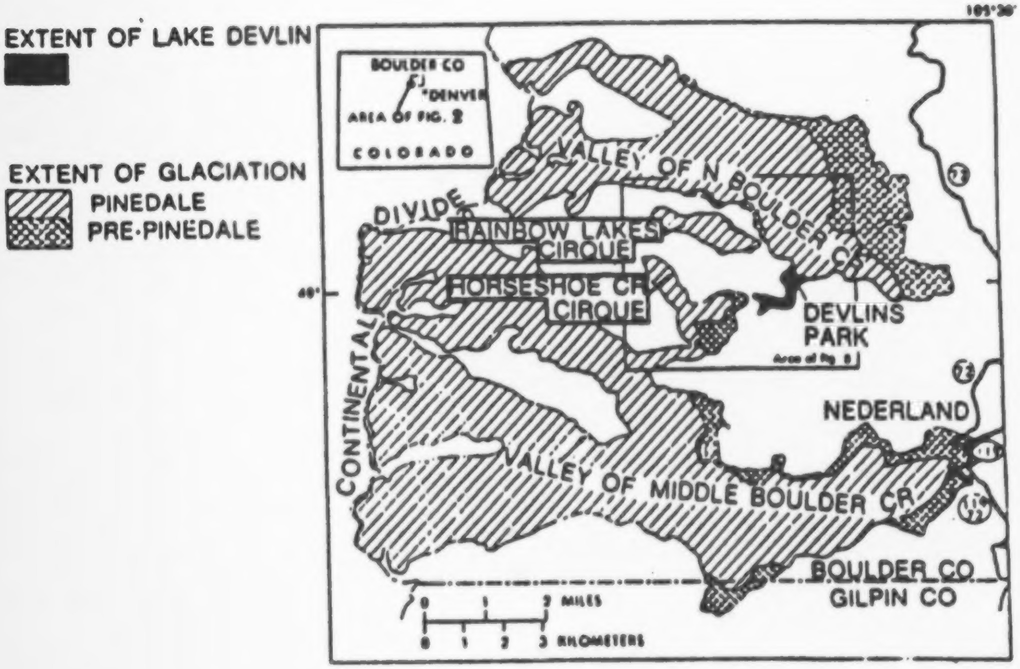
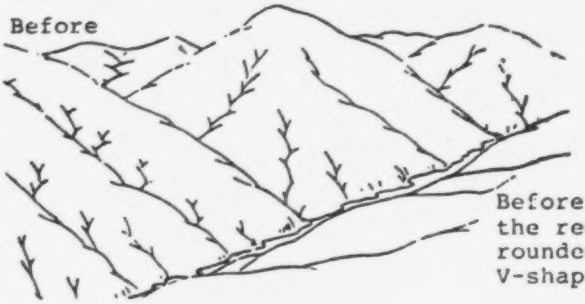

EXTENT OF LAKE DEVLIN
EXTENT OF GLACIATION
PINEDALE
PRE-PINEDALE
BOULDER CO
DENVER
AREA OF FIG. 2
COLORADO
VALLEY OF N BOULDER CR
DIVIDE
CONTINENTAL
RAINBOW LAKES CIRQUE
HORSESHOE CR CIRQUE
DEVLINS PARK
NEDERLAND
VALLEY OF MIDDLE BOULDER CR
BOULDER CO
GILPIN CO
0
1
2 MILES
0
1
2
3 KILOMETERS

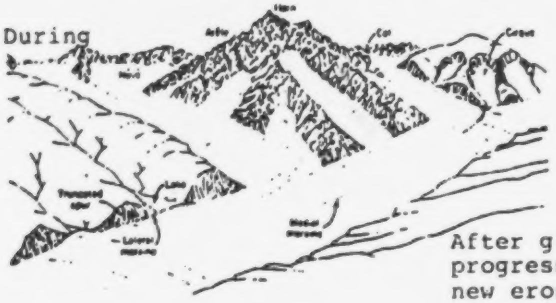
Figure 6. Glacial landforms and features.

Before



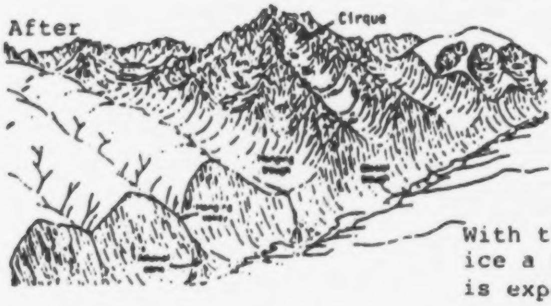
Before glaciation sets in, the region has smoothly rounded divides and narrow, V-shaped streams.

During



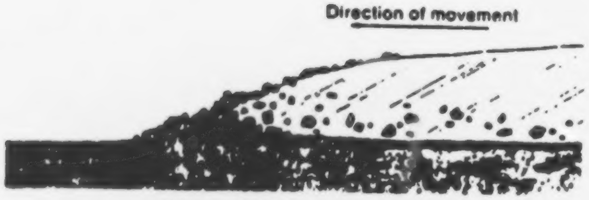
After glaciation has been in progress for thousands of years new erosional forms are developed

After



With the disappearance of the ice a system of glacial troughs is exposed.

Figure 7.



Till accumulates at the toe of a glacier, especially during periods of stagnation or retreat of the ice.

HOW A CITY SURVIVES: AN URBAN GEOGRAPHY FIELD TRIP

FIELDSTUDY

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The day to day survival of every city depends on the extraction, processing, and delivery of natural resources to each urban area's citizenry. Boulder, Colorado, nestled between the prairie and the mountains, produces almost none of its needed food, water, electricity, fuel, fiber, and paper products within the city limits. Boulder, like nearly every human settlement in the world, is totally dependent on an almost forgotten and faraway set of resources for its physical survival and growth.

American education tends to overlook the message about the importance of wisely managing resources for survival. Technology has distanced the school teacher and students from the primary producers of food, fiber, energy, and other essentials in our daily lives. A light is switched on without a clue about the complex set of systems in place to deliver instant illumination. Gasoline is burned in automobile engines without teenage drivers knowing the political, ecological, or social costs for easy-to-buy petrol. Orange juice, strawberries, or bananas are eaten for breakfast in midwinter in northern cities more than one thousand miles from their growth site without even a flinching notion of how they appeared at the breakfast table. In short, we are too illiterate and complacent about the food and materials we consume. Thus, a field trip in a city with strong dependence on outside resources may be instructive for teachers who could replicate a similar experience for students in every town in America. The message of geographic reawakening, the promise of future citizens as better environmental stewards, and the joys of pragmatic field experience are awaiting school classes.

Using Boulder to demonstrate an urban field trip enabled us to illustrate several key concepts including carrying capacity, human modification of the environment, the role of the citizen in shaping the future of the city, the importance of diversity, growth management, hazard mitigation, and recycling. The field trip utilized the following stops to illustrate these principles: Flagstaff Mountain overlook of Boulder Valley, Boulder Creek Bike path and flood mitigation measures, North Boulder planned unit development (a project with solar emphasis), the Betasso Water Purification Plant, and the waste water treatment facility with cogeneration power production.

From the vista of Flagstaff Mountain the participants were reminded about the geological forces that shaped the region, the early settlement pattern, and the location of Boulder City at the mouth of Boulder Creek. Droughts and floods, irrigation influences on the landscape, and the eventual network of transportation all shaped the urban form in earlier times. Citizen action moved to preserve open space and greenbelt. Building height restrictions, the Blue line limit (above which the city will not provide utilities), and a two-percent growth limit were imposed one by one to preserve and nurture the quality of life in the city.

After the devastating flood of May 30, 1894, Boulder struggled with appropriate land use regulations to guide development away from major hazard zones. The multiple use of the riparian creek corridor is testimony to public pressures to preserve high quality water amenities in the heart of the city.

The visit to the water purification plant and the hydropower addition high above the city illustrated thoughtful multiple use of precious water. Since every city has both a water purification plant and a waste water treatment plant, a ready field trip is available with applied lessons in chemistry, math, physics, biology, and economics. One who teaches civics, fine arts, or engineering also has a built in learning opportunity at too seldom seen public investments worth millions of dollars.

It isn't critical that students remember the technical details of activated sludge removal or trickling filters or flood proofing. What is important is to raise the environmental awareness of our direct link to a remote water supply. What we do when we turn the faucet or flush the toilet to other cities down river or down lake or to the air quality down wind is a matter of peaceful coexistence with natural resources that sustain us if we use them carefully and thoughtfully.

The citizens of the future will lead a life of greater respect and appreciation for the physical world around us if we have taken them into our local field laboratories. The stewardship of our nation and the ecological health of the world begins with a local understanding of the resources we too often take for granted, which should be incentive enough for us to increase our geographic literacy at the local as well as global level.

AGRICULTURE IN THE SHADOW OF THE METROPOLIS: A FIELD TRIP

FIELDSTUDY

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This trip is a "show-me-tour" of a fraction of the fringe of the Denver metropolis. The western half of Boulder County is mountainous with steep slopes and thin soils leaving little agricultural potential. But the eastern half of the county has had a productive agriculture since the 1870s.

World War II stimulated the growth of Denver. Urban land uses have spread northward dominating the southeastern quarter of the county. Although Boulder is the county seat, Longmont has been the agricultural service center. Louisville and Lafayette were originally mining towns. Broomfield was a tiny settlement until suburbanized by Denver's growth.

Since 1950, Boulder itself has been growing rapidly with the expansion of its educational and scientific research functions. Some light industry grew in association with the concentration of scientists. The space program accelerated this growth. At the same time, American's taste for residential space expanded. More spacious lots combined with many more people pushed the city out into the agricultural countryside. Perhaps the most severe blow to Boulder County's agriculture was the siting of a major computer manufacturing plant employing over 4500 workers half way between Boulder and Longmont in the early 1960s.

Niwot, until then an almost abandoned village, began its rejuvenation. Small subdivisions blossomed near the IBM plant. Longmont started to grow toward this new center of employment while Boulder, Louisville and Lafayette were influenced both by the new plant and by the accessibility to Denver. Longmont now looks less like an agricultural service center, and more like a "yuppie" suburb.

Increased urbanization affects the agricultural area both by displacement and by a sort of infection or contamination. Displacement occurs when a block of farmland is subdivided into lots for residential or other purposes. Contamination takes place as isolated bits of land within the agricultural area are taken over by urban people. Both processes are at work here. Only recently has subdivision been restricted to areas adjacent to already urbanized areas. Earlier subdivisions can be found scattered throughout the country. Meanwhile greater proximity to the city changes the choice of crop and livestock enterprises of the farmers themselves.

From the farmer's point of view there are both advantages and disadvantages to farming close to the city. Among the disadvantages are: trespassing and vandalism, dogs hunting in packs, low tolerance of urbanites for the smells, sounds, dust of ordinary farming practices and the slow speed of agricultural equipment and livestock moving on public roads. Among the advantages are the availability of part time or even full time jobs, accessibility to urban markets and special transportation systems. The very high land values are an advantage if the farmer is ready to sell out, but a disadvantage if he needs to expand his operation. Some land is available to rent from non-farming residents in the fringe, but often the tenure is quite insecure.

In this dynamic situation we find a mix of farming enterprises including commercial farms, many of which are part-time operations, subsistence homesteads, horse breeding, boarding and training operations, truck farms and other horticultural units such as nurseries, sod farms and flower growers with and without greenhouses, "factory" type poultry and hog producers, and a variety of specialized operations.

MAKING CONTOUR MAPS

ELEMENTARY

Pupils build models and use a ruler and water in a pan to develop contour lines on them. These lines are projected onto a flat piece of heavy acetate or plastic above the model to show a contour map of the model.

Developed by Edith West and
Adapted by Phyllis Clarke
Boulder Valley Schools
Boulder, Colorado

Objectives

1. Know that contour lines connect points of equal elevation.
2. Know that contour lines show height, shape, and steepness of slope as well as elevation.
3. Interpret contour lines to visualize surface relief as well as to identify elevations.

Grade Level Fifth

Teaching Time Three class periods

Materials

Clay for making models (some kind that will not loose shape in water, i.e. plasticine). Pointed object or knife to make lines on models. Pan large enough to hold model and tall enough to submerge all of it. Water. Ruler attached to one side of pan, with 0 at bottom of pan. Dowel sticks or other straight sticks cut into different lengths, with a number of each length, each length 1/2 inch shorter than another. Heavy piece of acetate or plastic to be used to project contour lines above the model. Marking pen for acetate or plastic.

Procedures

1. Prepare a clay model of a high hill. Make the model so that one side is very steep, another is very gradual, and one has a valley in a somewhat steeper side than the gradual one. Try to make the model so that the hill seems very irregular.
2. During class, place the model in the empty pan, with the ruler attached inside on one edge of the pan. Pour in a half inch of water. Use the knife or sharp tool to make an indented line around the model at the water's edge. Bring the water level of the pan up to one inch and repeat the process of making a line on the model at water's edge. Add water one-half inch at a time, repeating the process each time, until the model is covered or there is less than a half inch at the top of it. Work quickly so that the model is not damaged by immersion too long in the water.
3. Remove the model and dry it. Now stick in the longest dowel sticks at the very edge of the model. (Put them about 1/2 to 3/4 inches apart all around the edge.) Make these sticks high enough to clear the model and to support the acetate above it. Now do the same thing with the dowel sticks one half inch shorter at the first contour line up on the model. Repeat the process with shorter and shorter sticks until all of the lines have sticks coming up to the same height above the model.

4. Place the heavy piece of acetate or stiff plastic on top of the sticks so that it covers the entire model and extends past it a short distance. You may wish to use glue or paste to help hold the plastic in place. Use a marking pen on the plastic to connect the stick ends at the outer edge of the model and then to connect the sticks rising above each of the water lines on the model.

SAY: Suppose this hill is _____ feet high and _____ feet in diameter. Since each of these lines is one-half inch higher than the others, each half inch on the contour map represents a rise of _____ feet. Mark in the contour intervals and begin a map legend for the vertical scale. Since this hill is _____ in diameter and on the map this distance is represented by _____ inches, what is the horizontal scale? Mark this on the map legend.

THEN ASK: How far would it be from this point on one contour interval on the steep side of the hill to this point (on a line going directly up on the next contour interval)? How far would it be from this point on a gradual slope, to this point at the next contour interval up? Let pupils use the horizontal scale to figure these distances.

5. Have pupils compare the contour map with the model of the hill. What happens on the map when the hill is steep? When it slopes gently? Where there is a valley? Keep this model for a time where pupils can compare model and contour map.

6. Now have pupils make their own models of hills and follow the same process in making contour maps of their hills. Have them compare their maps with the model, noting how the contour map shows height, shape, and slope. Let pupils keep both their models and maps for future use.

MAKING PROFILE DRAWINGS FROM CONTOUR MAPS

ELEMENTARY

Pupils make profile drawings from their contour maps and compare the drawings with both the original clay models used to make the contour maps and with the maps themselves.

Developed by Edith West and
Adapted by Phyllis Clarke
Boulder Valley Schools
Boulder, Colorado

Objectives

1. Know that contour lines connect points of equal elevation.
2. Know that contour lines show shape and steepness of slope as well as elevation.
3. Interpret contour lines to visualize relief as well as to identify elevations.

Grade Level Fifth

Teaching Time Two class periods

Materials

Graph paper; pencils or pens; models and contour maps made by pupils and by the teacher in the previous activity.

Procedures

1. Demonstrate the making of a profile drawing using the contour map you made of a model hill in the previous activity. Mark an imaginary compass rose on the contour map. Place the top edge of a piece of graph paper across the contour lines in the direction in which you wish to show a profile (e.g., north, south). At the edge, mark off each contour interval. Use dots, and note the elevation for that contour interval next to it.

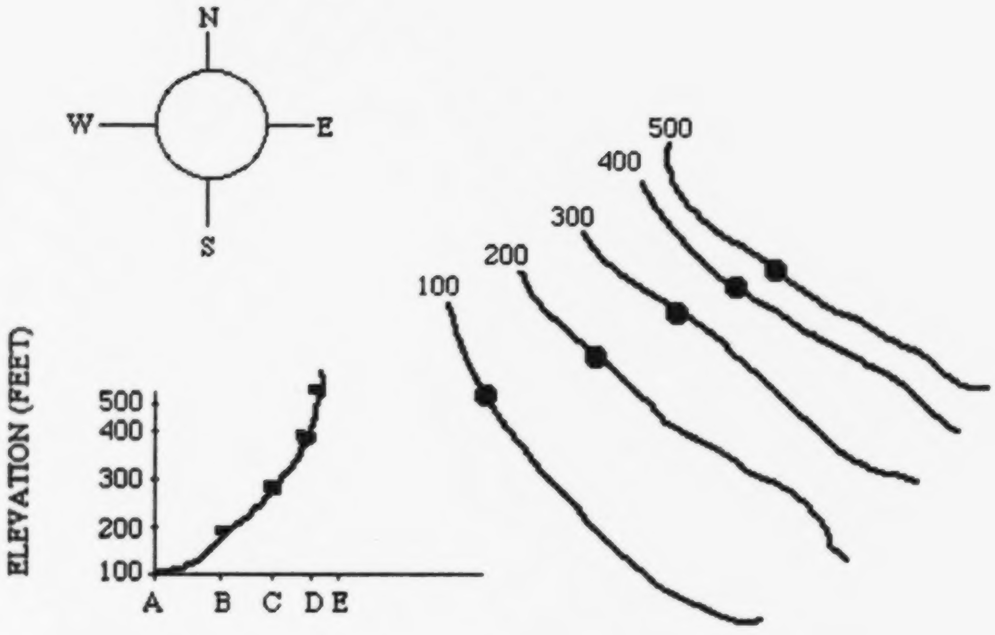
Draw a line across the bottom of the graph paper. Draw a vertical line on the left hand side of the paper tracking the horizontal line at the bottom. Mark the vertical line at the bottom up to the top elevation shown on the contour map. (Let each square represent the number of feet in a contour interval.) Use a straight edge to transfer the data on the top margin of the paper to the proper elevation vertically below each dot. Connect the dots to provide a profile of the hill.

You may wish to make other profile drawings showing the hill from different directions. Have pupils compare the profile drawing with the model itself. They should note similarities in height and slope. Then have pupils compare the profile drawing with the contour map to help them see how distance between contour intervals tells one something about the relative steepness of the slope of an area.

2. Now give pupils heavy cardboard for mounting their models. Have them place imaginary compass roses on the cardboard and on their contour maps so that the two are oriented in direction. Now have pupils use graph paper to make profiles running north and south and then east and west. Have them compare their profile with their models and with their maps.

3. Later, after completing the model activity, show pupils how to make more elaborate profile drawings of real contour maps. They should add dots at the top of the paper for landmarks such as rivers, railroads, highways, and buildings, etc., with each name beside the dot and an estimated elevation listed for each. Start the vertical line on the left hand side of the paper with the lowest contour interval shown on the map. Use the straight edge to place dots for the objects indicated at the top in the graph below the dot on the top edge.

Example for Procedure #1:



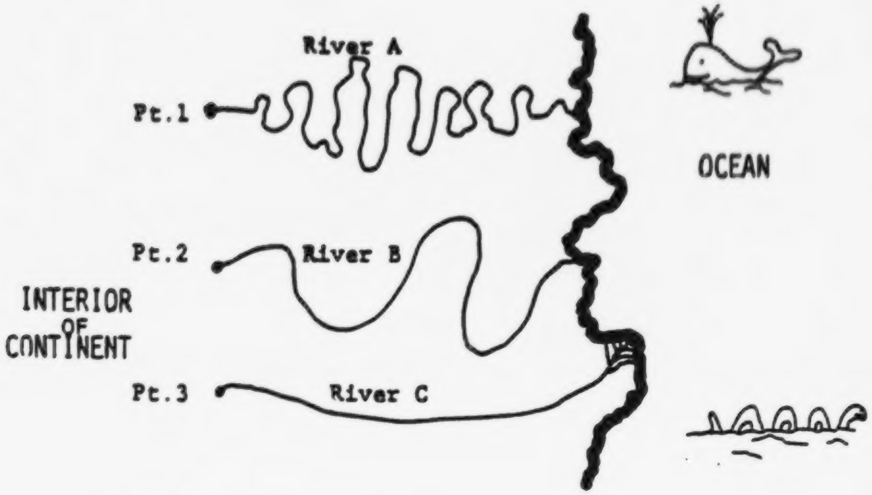
ELEMENTARY

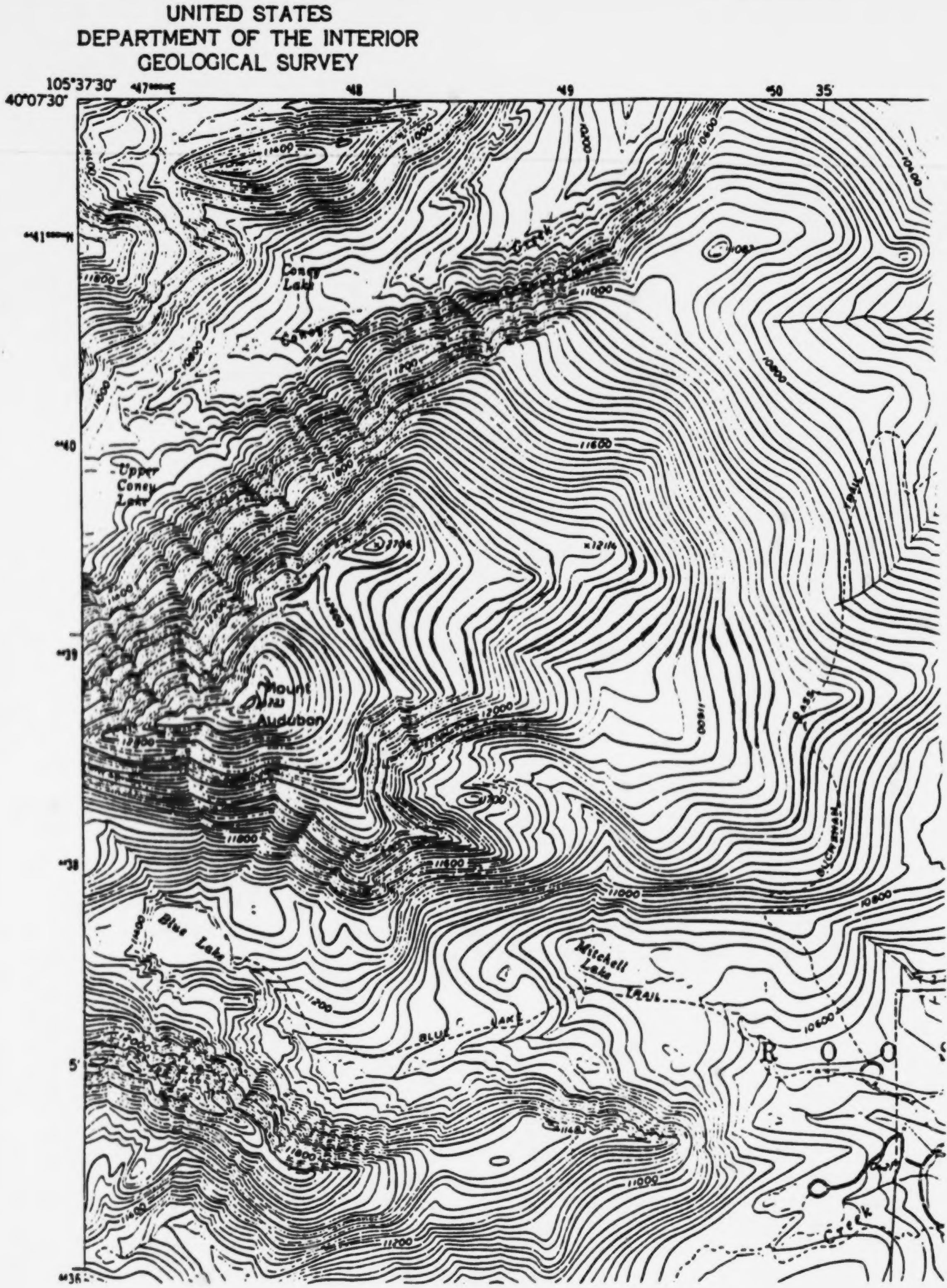
MAKING PROFILE DRAWINGS FROM CONTOUR MAPS

Look at the diagram below, then answer the following questions:

_____1. Which river flows most rapidly? (a) River A, (b) River B, (c) River C.

_____2. Which place has the highest elevation? (a) Point 1, (b) Point 2, (c) Point 3.


River A
Pt.1
OCEAN
Pt.2
River B
INTERIOR OF CONTINENT
Pt.3
River C


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
105°37'30"
40°07'30"
447000mE
48
49
50
35'
4441000mN
40
39
38
5'
36
Coney Lake
Upper Coney Lake
Mount Audubon
Blue Lake
Mitchell Lake
Creek
TRAIL
BLUE LAKE
BUCHANAN PASS TRAIL
ROO
11600
12000
11000
10800
10600
11200
11800
12116

MAPPING USING HYPOTHESES

ELEMENTARY

Students use maps of Peru and Ecuador to learn about land forms.

Developed by Edith West and
Adapted by Phyllis Clarke
Boulder Valley Schools
Boulder, Colorado

Generalizations for Teacher Use Only.

1. Rivers flow from higher elevations to lower ones. (Mountains frequently, but not always, provide the source of rivers.)

2. If river sources are found close together but the rivers flow in different directions, the point between the river sources is the highest point in the area and represents a mountain divide if it is found in a mountain range.

3. Rivers flow more rapidly, but more deeply, and flow in a straighter line down mountain valleys than through plains; they flow less straight on high plateaus then on mountains but usually with fewer loops than on lower plains with less relief. Rivers flowing through relatively flat plains move more slowly than in mountains; they tend to turn and twist back on themselves, forming many loops.

Procedures

Explain to the class that they are going to make hypotheses about the land forms of Peru and Ecuador. You will ask them questions that will help them to predict where land forms would be, but they may make mistakes because they do not have enough or accurate information. Help them to do the best job they can and to take enough time to think carefully about the questions you ask them. They will have an opportunity to check their hypotheses and make corrections.

1. Give the class the map of Peru and Ecuador showing only boundaries and rivers.

2. Define the concept "map pattern." Point out that maps can show many kinds of patterns, e.g., urban development, mountain ranges, etc.) Ask: "What does this map pattern show? (point to rivers) Have the class make a legend to distinguish between rivers and the countries boundaries.

3. Have the class study the map of rivers more carefully. Ask: Can you tell from this map and from what you know about rivers how they flow? Can you tell where the mountain ranges and divides are? Can you tell where relatively flat land is found? Ask further questions as necessary: Where do rivers begin? (or where do you find the source of rivers?) Do they flow from low to high or high to low areas? Do rivers in mountains or on plains tend to cut more deeply and flow most directly? Where do the rivers frequently tend to twist and curve back on themselves?

What would happen on a plain if a river curved much and a flood caused it to flow rapidly. (You may wish to remind pupils of rivers they have seen in Colorado, including views of valley rivers from the Trail Ridge Road). The list of generalizations presented above are to help you formulate questions to get pupils to hypothesize. Do not show it or give it to pupils.

4. Have pupils use the sketch map of Peru and Ecuador to indicate possible mountain ranges, mountain divides, high plateaus, and low plains. Pupils might work individually or as couples to do this.

5. Now show a map of South American or of Peru and Ecuador that uses color layers and shading/hatching to show elevation and physical relief. Remind the class that the maps shows a pattern of landforms and elevations.

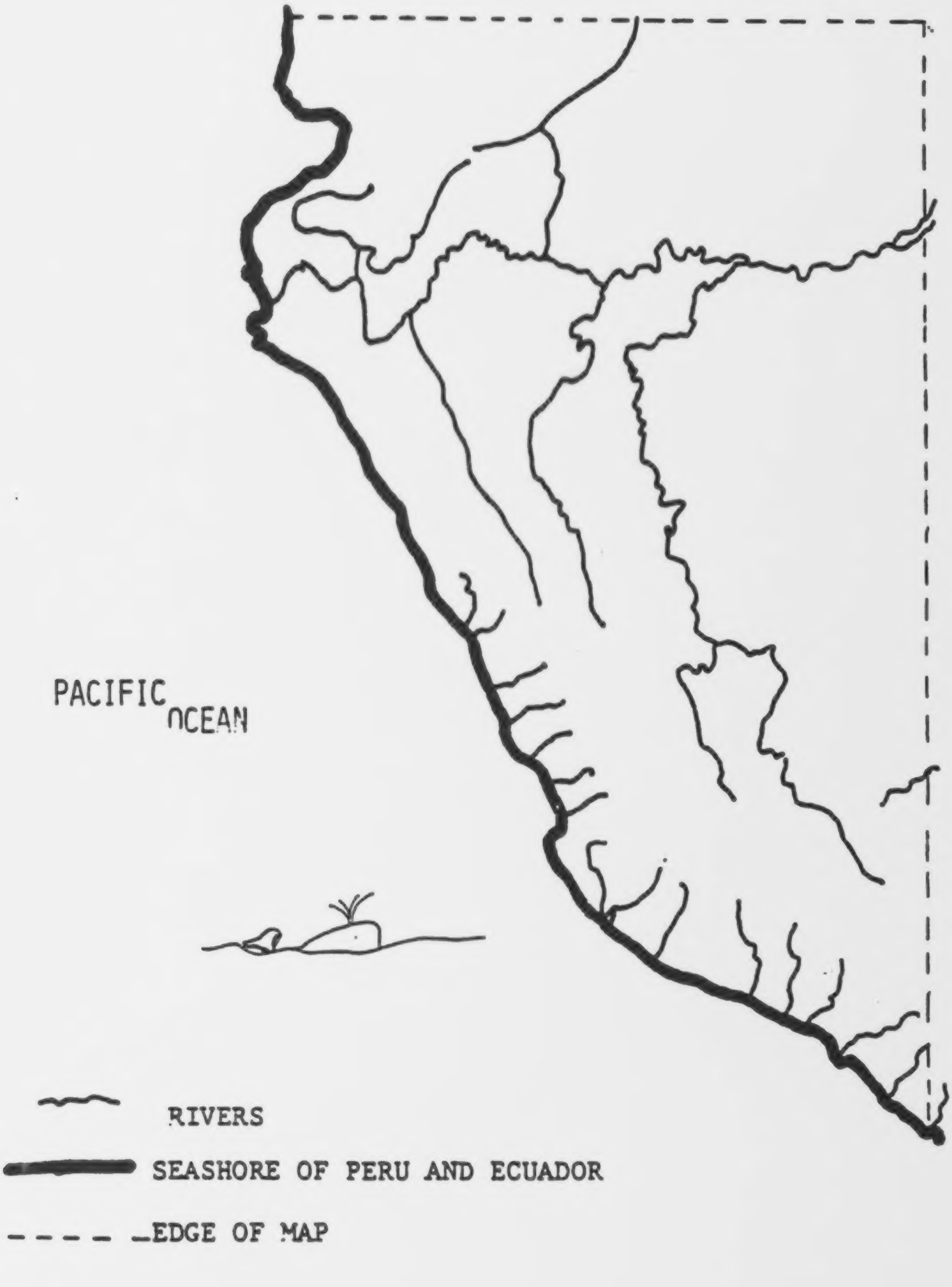
Have pupils compare their completed maps with this one. To what extent were they able to use their knowledge about rivers to guess patterns?

Discuss where they went wrong and why.

6. Lead the class to the generalizations stated above through questions you ask. Write down the generalizations.

Optional: Some students may wish to redraw the mountain ranges after looking at the map. Give them a new map and let them redraw the area using the map and generalizations.

After a day or two give the class the following exercise and see if they can apply the generalizations.


PACIFIC OCEAN
RIVERS
SEASHORE OF PERU AND ECUADOR
EDGE OF MAP

LANDFORMS PICTURE DICTIONARIES

ELEMENTARY

By creating land surface models, students learn about the distinguishing characteristics of land and ocean surfaces.

Susan Powers
Boulder Valley Public Schools
Boulder, Colorado

Key Concepts

The shape and contour of the land surface and ocean floor is of importance because landforms are what all cultural and natural events occur on.

The form of the land plays an active role in the unfolding of natural events and also plays a passive role with respect to human events.

Knowledge of the nature and distribution of landforms can affect the chances of living in a survival situation.

Geographic study of landforms is explanatory as well as descriptive and we can learn about the ocean floor by comparing its landforms to what we know and see.

Landforms are constantly being changed by the wind, water, air, and man.

Experiment and Activity

1. Have each student define the following terms, using a dictionary, atlas, and/or social studies text:

abyssal plain
cove
sea
archipelago
gulf
shoals
bay
island
sound
cape
isthmus
strait
channel
ocean
trench
continental shelf
peninsula

2. As a whole group discuss and sketch or visualize each term. A map of the world without water in the oceans is a motivating and helpful resource at this time.

3. Give each student a blank dictionary and have them include on each page the term, definition, and a picture.

They may use pictures from National Geographic magazines or draw and color each illustration. Students generally enjoy this activity a great deal and therefore we also include a list of 20 to 30 optional terms for those who wish to do more.

4. In teams, groups of 5 or 6 students, have them make models of each landform out of clay. This works very well in conjunction with the model of the ocean floor activity. Paper mache models also work.

5. Have the students display models and point out similarities and distinguishing characteristics of each landform.

6. Teachers may choose to quiz students on their terms at this point as they have reached a very clear understanding and are proud to exhibit this.

Discussion

Guiding Questions

How can people use their knowledge of the land to help them survive?
How can people protect existing landforms?
How does the weather affect landforms?

Discussion Processes

As students define the terms, refrain from answering their questions such as "How can you tell the difference between a bay and a cape?" Ask them questions that will lead them to note similarities and differences.

They will also look for your help when illustrating. When they show you a picture and ask "Is this a sound?" have them tell you what makes them question it. Generally, this leads to a discussion of how landforms are a product of nature and therefore are not all alike.

After the groups point out each landform on their model, pose some "what if?" questions to them concerning changes caused by everyday weather, extreme weather, and by humans.

Materials

National Geographic magazines, dictionaries, atlases, social studies texts, maps, globes, paper bound and covered with construction paper (a plastic spiral binding machine works beautifully and insures a professional looking product).

Other Possible Activities

Social Studies

Contour mapping of the ocean floor models.

Play Unlocking the Map Code, a Rand McNally set of computer disks defining and quizzing students on knowledge of landforms and basic map and globe skills. This is then applied to a simulated flight plan.

Play The Oregon Trail, a MECC survival simulation computer game.

Math

Play Explorer Metros, a Sunburst computer simulation in which you make survival decisions based on knowledge of metric measurement and landforms.

Humanities

Have the students study how landforms in their area are being destroyed by humans and discuss their feelings on this. (For example, in our immediate area of the Rockies there are disputes about mining and also about nuclear development plants.)

Resources

The Ocean Floor map along with the guide and tour-book. This beautiful sky view of the world without ocean water is definitely a good investment. Check your local bookstore. Otherwise send $12.55 (California residents) or $11.95 (all others) to Celestial Arts, P.O. Box 7327, Berkeley, CA 94707 (415) 524-1801.

Mitchell, Lucy Sprague. Young Geographers. Bank Street College of Education, New York. 1971.

Dictionary of Geological Terms. American Geological Institute, Bates and Jackson. New York: Doubleday, 1984.

PRIMARY MAPPING, DISCOVERY IDEAS, AND ACTIVITIES

ELEMENTARY

These activities will provide students with knowledge about the physical environment and the relationship of humans to their environment. This means students will interpret symbols and legends; determine directions on maps and globes; locate places on maps and globes; and use maps to gather or organize information, to draw inferences, and to hypothesize.

Beth Arnold
Coal Creek Elementary

Jeannine Myers
Martin Park Elementary
Boulder Valley Schools, Colorado

Discovery Ideas

Copy the following activities onto note cards and place in the discovery box. Most can be done independently or in pairs.

1. Weather Report

Listen to or read a weather report, and list 10 weather terms. Alphabetize the words, then see how many you can find in placenames. Write a funny weather report featuring the placenames you find.

2. Design a Zoo

Mammals, fish, reptiles, insects, and birds often hide in placenames—Deer Isle, Spider Lake, Troutdales. Find examples on a map and list names by the categories above. Draw a creature to go with each, write the place on it, then house in an appropriate pen, tank or cage.

3. Study a State

Pick a state from the discovery box and find out how it got its name. What is the capital? How was the capital named? Write a paragraph about the state.

4. Color Squares

Find placenames that feature colors, e.g., Green Bay, Wisconsin, Purple Mountain, Wyoming, Carmine, Texas. Draw a checkerboard design and write each one in a separate square. Color the squares to match the names.

5. Big or Little

List in alphabetical order adjectives that describe size, shape and appearance. Locate placenames, e.g., Roundhead, Ohio, Ugly Creek, Kentucky, to go with as many as possible. Use the placenames to write and illustrate a poem.

From Instructor Magazine, April 1987.

Geography in the Newspaper

Where in the World

Find the names of five cities in today's newspaper that you've never heard of before and list them below; include the country where the city is located. Find each on a map, using information in the articles to help you. If you can, record longitudinal and latitudinal location for each city as well.

	longitude	latitude
1.		
2.		
3.		
4.		
5.		

On the Road Again

If you had to move today to any place mentioned, pictured or described in today's newspaper, where would it be and why?

Using information you read in the newspaper, tell what would be the last place in the world you would want to live and why.

Physical Geography in the News

Lowlands flood; climbers scale mountains; and guerrilla warfare is carried on in the hills. Count how many news items you can find in today's newspaper in which physical geography plays a key role. If you can find more than five, you're king of this particular mountain!

Hot Spots

Where are the "hot spots" in the world today, the areas where there's war or the threat of it? Identify these places by looking through the newspaper. Ask your parents or teacher to go over the problems of the area with you. Then write an editorial about what you think should be done about the problem.

Home Town, U.S.A.

Try your hand at making a travel brochure for your home town using maps, photos and articles about the area to help you. Just looking through the newspaper will give you an idea of some things a visitor might want to see or do that you might have overlooked. For example, in addition to the newspaper information about what the town is like as a whole, you might want to write in lists of the best hotels and restaurants, places for entertainment, historic landmarks, etc. Simply staple all the pages you make up together, draw a great cover and you'll have the finished brochure—plus a fine geography report for school!

Culture Shock

Different countries have different cultures.

Culture is a word used to describe the customs, ideas and skills of a given group of people. Now that travel and business bring more and more people from different cultures together, it's important to learn as much about other countries as we can. For example, when a major car manufacturer tried promoting an American car named "Nova" in Mexico, it didn't sell. That's because in Spanish "no va" means "no go"— and who would want a car that didn't go! That was a real culture shock! Make your own "Cultures of the World" poster using items cut out from the newspaper that mention, picture or describe different aspects of other cultures. You might even discover that we're not so different from others after all!

Globetrotters

List the names of 10 foreign places in the newspaper; then locate each on a world map. You may want to choose one of these places to write about in your next school report.

Connections

The United States is connected with other countries around the world in many ways: we rely on one another for various goods and services. This is called interdependence. You

Primary Mapping

- Use a concrete experience
- Model mapping for the children
- Outline basic land form or forms
- Discuss and identify the land form or forms to be visited
- Provide individuals or small groups with copies of outlined land form or forms
- Visit site
- While visiting, have students observe and make a pictorial record of what they see
- Using "temporary" spelling, have students label their pictorial record

After the first experience you may wish to have students develop symbols and legends for their maps to be recorded on a second outline map.

can use newspaper ads to show how this works. Look for items that are being sold here but were made in a foreign country, such as Japanese cars or Italian shoes. See how many different countries you can find. When you count them all up you may be surprised! (You can try this with items already in your home as well.)

Ideas from "Between the Lines," Daily Camera, 1987.

Map Fun

1. Home Away From Home

Map out the classroom into streets, avenues, and lanes. This can be done by putting masking tape on the floor or by putting "street signs" on the rows. Have students choose street names and give everyone an address according to where he/she sits. Then try the following activities:

Call the role by addresses and let students respond with their names.

Have students give and follow directions to each other's "homes."

Make a map of the room and hang it up to help students grasp the relationships between a map and an actual place.

2. Our Town

Spread some brown paper on the floor and have students use markers to draw an imaginary town. Name the streets and avenues. Locate the stores, homes, and so on. Be sure to include a train station. Invite your students to imagine they're at the station when a fictional character arrives and asks directions to a specific place, e.g., Garfield looking for a food store. Ask them to write a story about the experience, including the directions they gave.

3. X Marks the Spot

To prepare for parent's night, provide each student with a map of the school. Have them mark their classroom with an "X" and give directions from the special places they want their parents to visit, such as the gym, art room, etc. Be sure they take their maps home just before parent's night.

4. Born to Shop

Make a map of your local supermarket, showing the aisles and in general the types of food they contain. Duplicate the map so everyone has a copy. Have each student make a menu of a favorite dinner, checking cookbooks for ingredients. Then let the students "shop" with the maps, marking their route from start to finish and putting a star wherever they stop to pick up something. Later, let them share their descriptions with each other.

5. On the Road Again

On a map, pick two cities about 300 miles apart. Describe a trip between them, in which you take the most direct way out and a more roundabout way back. Have your students follow the routes on copies of the map. Alone or in pairs, the students then plot their own trips and create a log of what they saw.

Ideas from Learning Magazine, April 1987

The following activities represent a joint effort of faculty from Whittier, Martin Park, and students from Martin Park.

Compiled by the Martin Park Grounds Committee, Mrs Robyn Lawrence, Mrs. Lisa Vanderlinden, and Mrs. Kate Capage.

State Hop

The class is divided into two teams. The teams stand outside the map. The leader has a set of cards with all of the names of the states. The leader picks a card. The player must name each state he passes through to get to the one on the card. If he misses a state he goes back to the one correctly named. If he can't name a state and can hop over it, that counts.

Variation: Give one point for each state correctly named. The team with the most points wins.

From Coast to Coast

Two teams are formed. One team is on each coast. The leader has a set of question cards. Each team has a designated runner. The object is to get to the other side first. All members on the team can answer the questions. The runner can only run to a state that touches a state that they are in.

Suggestions for questions:

1. Name a state in the Southeast.
2. Name a state in the Northeast.
3. Name a state in the Northwest.
4. Name the Grand Canyon state.
5. What river flows through the Grand Canyon?
6. Name a state in the Pacific time zone.
7. Name the state with the greatest number of high mountains.
8. Name the Bayou state.
9. Name the car capital of the state.
10. What is the "Big Sky" country?

Any student can make up a question to put on a card for use in the game.

Blindman's Bluff and Twenty Questions

One student is "it" and blindfolded. The person "it" is whirled around until he/she lands on a state. The rest of the players then ask "it" questions about the state he/she landed on until "it" guesses the correct state.

State Capitals—Identify and Place in Correct State

The students use the atlas and maps in the classroom to identify the capitals of all the states in the U.S. They can then make name tags to place on the map. The name tags can then be placed in the correct state.

Indian Tribes in the U.S.

Students can read and find out where tribes lived in the U.S. Symbols can be made for certain tribes and thick yarn can be used for designating boundaries. The students can then place the symbols and yarn in the appropriate places to identify where the various tribes were located.

Walking the States by Neil Owens

The first player walks through three states. The next person names those states in order. If correct, that person walks and the first person goes to the end of the line.

Variation: After each player has had a turn add a state so you walk through 4, 5, 6, etc. until you decide to quit. If a person can't answer correctly that person goes to the end of the line.

Run For It by Jenny Marucheau and Carissa Smith

The captain calls out a state in the United States. All the players run and stand on the state that was called. Whoever gets there first is the new captain. The judge says who got there first. Then the runner goes to the end, the captain becomes the runner, the judge becomes the captain and the next player becomes the judge.

I'm Thinking of A State by Jason Stone

Think of a state. Others try to guess. People get five guesses. Person who thought of the state gives hints on location, state symbols, beginning letters, etc.

Point system:

If you get it after the first hint: 25 points

2nd: 20 points

3rd: 15 points

4th: 10 points

5th: 5 points

Starting at Colorado by Ronald Reigenlsperger

The person who is first stands on Colorado and listens to directions. The director says, for example, 2 west, 1 north, 3 east. The person follows those directions and moves to that state. If correct, the person gets another turn, if not he/she must go to the end of the line. Maximum of two turns in a row.

THE WORLD IN A CHOCOLATE BAR

ELEMENTARY

As the teacher leads students to an understanding of the interrelationships of the peoples of the world, students learn that a chocolate bar is the product of an interrelated system with connections throughout the world.

Corine O'Donnell
Campbell Elementary
Arvada, Colorado

(Adapted from Living Together on Our Planet Earth, by the Social Studies Department of the Jefferson County Public Schools, Colorado, 1987, Field Test Edition.)

Level 4th grade and above

Geographic Themes

Location
Movement
Human-environment interactions

Materials

Poster: "The World in a Chocolate Bar" (Originally printed by UNICEF and Global Perspectives in Education. Contact: Melinda Greenblatt, U.S. Committee for UNICEF, 331 E. 38th Street, New York, N.Y. 10016, (212) 686-5522, X470.)
World Map
Washable markers
Colored yarn
Tape or pins
Mini chocolate bars (optional)

Procedures

Define.— "system" - something made up of parts that work together smoothly.

Warm-up activity.— give students one or two minutes to list as many systems as they can, keeping in mind the above definition of system.

Share and list—on the board some of the systems students listed. Discussion:

a. Why is it a system?
b. What are its parts?
c. What happens if one part isn't working?

Map work.—Individual students locate on a world map the countries of Ghana, Ecuador, the Philippines, New Zealand, Japan, Canada, the U.S.S.R., Sudan, the U.S.A, United Kingdom. As each country is found, have student name the continent on which that country is located.

Introduce poster.—The World in a Chocolate Bar. "We depend on people from these countries for one of our favorite foods. Can you guess what it is?" Accept a few guesses, then display the poster, The World in a Chocolate Bar.

Cooperative learning groups.—Form groups of four or five students and give each group a poster and a washable marker.

Group task.—a) Select recorder/reporter; b) read/study each picture and caption; c) list chocolate bar components and country of origin; d) group members write their names on picture #11.

Class discussion.—a) "What are the components and where do they come from?" (Teacher lists these on the board); b) "How many places will have connections to ships and trucks?" (all of them); c) "Can you think of any places not shown on the poster where there might be connections?" (warehouses, grocery stores); d) "Where will your connection be?"

Critical thinking questions.—(can be discussed in cooperative learning groups or as a class). "The chocolate bar system is just one part of a gigantic system called the world food supply system, which sometimes has problems and breaks down."

a. "What might make the world food supply system have problems? (no rain, crop failure, poor transportation, lack of energy sources, floods, labor strikes, etc.)

b. "What happens when the world food supply system breaks down?" (find new sources of food, people starve)

c. "How can we help people in other countries where there is a shortage of food?"

d. "How do we help the chocolate bar system when we eat them?

e. (Optional) "Would you like to do your part in keeping the chocolate bar system working?" (Distribute a small chocolate bar to each student.)

Closure

Review the definition of "system" and the systems listed at the beginning of the lesson. "Why is the world food supply a system?"

Evaluation

Students list three or four connections in the chocolate bar or other food supply system.

COLORADO GET AWAY

ELEMENTARY

This activity focuses on Colorado but could easily be adapted for use in any state. By planning vacations, students will increase their knowledge about their home state.

Sylvia C. Sather
Phillips Elementary
Denver, Colorado

This activity is intended for groups, but it also works for individuals. After the trip is planned, the groups or individuals make a presentation to the rest of the class.

Objective

Given the opportunity to plan an "ideal" vacation, student will be able to identify the effects of loss of energy sources on their lifestyle.

1. Have the students plan their own "ideal" vacation. (14 days only).
2. Inform the students that their plans must include:
   - a. Modes of transportation
   - b. Duration of travel
   - c. Stop-over sites and lengths of time spent at each site.
   - d. Routes of travel.
   - e. Plans for recreation and enjoyment.
3. After the plans are completed have the students identify all the sources of energy used during the vacation trip.
4. Have the class discuss the depletion of the energy sources of oil, gas, and coal.
5. Have the students replan their "ideal" vacation without the use of the energy sources of coal, gas, and oil. Try to complete the original trip as much as possible.

Resources

Map: Colorado Department of Highways, 4201 East Arkansas Avenue, Denver, CO 80222

Cost: Free- Write to the above address and maps will be sent free for classroom use.

Books: AAA travel and camping guides to Colorado

*Extension Activity—Groups create a commercial about their trip that should convince the rest of the class that they would like to accompany them on the ultimate "Colorado Get Away."

Student Handout: "Colorado Get Away"

Materials

Colorado Road Maps.

1. Warm Up Activities - Locate and identify places at these integers or coordinates:

J8 ____________________
B18 ____________________
07 ____________________
I15 ____________________
G10 ____________________
D14 ____________________
H5 ____________________
C14 ____________________
M14 ____________________

B1 ____________________
N21 ____________________
M10 ____________________
G14 ____________________
H2 ____________________
017 ____________________
B14 ____________________
J6 ____________________
P3 ____________________

*Those students that want to extend their knowledge can create questions for others to answer using coordinates for parks, forests, towns, cities, or other mapped features.

2. Draw routes connecting three of the above areas. Calculate mileage and the routes to be taken.

3. Students plan a 6-day trip going to at least three different National or State Parks or Forest lands (in Colorado).

Items for consideration:
4 people
$1000.00
Type of vehicle - (MPG)
Entertainment and recreation costs
Motel costs ($55 per night?)
Fuel costs
Entry fees $5.00 car
$6.00 a night camping per car
Food costs
Mileage

URBAN LAND USE CHANGES

JUNIORHIGH

The objectives of this lesson include assisting students in explaining changing land use patterns in urban areas; to complete a simple land use map of four blocks of the Boulder Mall area; to assist students in an analysis of patterns on the Mall over the last decade; and to identify forms of diversity present in an urban area.

Steven E. Wanner
Burbank Junior High
Boulder, Colorado

Estimated time 1 1/2 to 2 weeks

Objectives

1. To assist students in explaining changing land use patterns in urban areas;
2. To complete a simple land use map of four blocks of the Boulder Mall area;
3. To assist students in an analysis of patterns on the Mall over the last decade;
4. To identify forms of diversity present in an urban area.

This is one of several optional activities in an Urban Geography unit taught to seventh graders as a part of a required class. It takes approximately 1 1/2 to 2 weeks.

The class covers approximately two weeks of general background on cities and urban living. Students are encouraged to start their projects early and are told that some extra time can be made available. The project is done only in groups of four.

Students who show an interest in the project form their groups and meet with me to receive instructions.

Several methods could be used to complete the gathering of the information for this activity, but direct field work enhances the involvement of students.

They are instructed to go to the Mall and draws rough sketch maps of each block. The specific use of each ground level space is to be recorded and distances paced off and recorded.

Trip to the Mall

Students go to the Mall after school or on a weekend. Some groups can do this in one trip, others require two. We have never had a group take more than three trips. Groups of four allow for the students to work in pairs or if they want, each can do one block alone. The group members then bring back the rough maps. These are checked for general accuracy and content. If additions are needed the group or individual members of the group may return to collect the needed information.

Completion of the Finished Map

The group's next step is to take their findings and transfer them to the final, usable form. Over the years I have settled on a color key and a scale that allows for easy comparison of the maps from year to year.

If the students have done a reasonably accurate job of pacing, their final map will be approximately 3 feet by 3 feet in size. The structures will me divided into ten general classifications such as offices, general retail, clothing, etc. These will be colored to follow a standard key.

Interpreting the Maps

After completing their maps the groups are then shown maps from previous years. Using these, the students then answer the worksheet questions.

Interpreting Maps

1. Identify ways the Mall has changed these four blocks. Use the first and last maps the most, but don't overlook the others.

2. Are there any obvious specific or general patterns? Explain.

3. What type or types of activities have declined? Can you propose reasons for this?

4. What type or types of activities have declined? Can you propose reasons for this?

5. How has the pattern of parking changed? What affects could this have on activity in this area? How might this affect the role of mass transit?

6. What has been done to make the Mall a "people place"? List four specific parts of the design and give your point of view as to how these accomplish this objective.

7. What types of materials are used in the construction of the building exteriors? Do materials seem to be different depending on the age of the building? Give examples and explain.

8. List three examples of other cultures on the Mall.

9. Identify one store that is part of a national chain. Make some assumptions as to why Boulder was chosen for a store location. Try to find out exactly why. People in the store may be able to furnish you this information.

10. Looking back over the last few years, what significant economic events in or out of Boulder may have affected the economic health of the Mall? Give at least one example and develop reasons why this event either was good or bad for the Mall.

MAPPING WATER QUALITY PROBLEMS

JUNIORHIGH

The object of this presentation is to demonstrate how to identify and map local water pollution problems by using local topographical maps. The first activity is for students to create a simple three-dimensional model from a simplified contour map. Students will then be able to recognize that water flows perpendicular to contour lines. This is true not only for surface water but for groundwater in the uppermost or alluvial aquifer as well. Most groundwater flow and almost all groundwater pollution occurs in the uppermost or alluvial aquifer. Because alluvial groundwater flow usually follows surface topography, a simple 7.5 minute topographical map is sufficient for mapping most groundwater flow and groundwater pollution as well as surface flows and pollution. Sources of water pollution can be identified as well as potential threats to the quality of local drinking water sources. This lesson can be adapted to any secondary level.

Steven C. Slater
Northglenn Junior High
Northglenn, Colorado

Three-Dimensional Topographical Models

Geographic Themes

Movement and Relationships within Place: Humans and Environment.

Objective

The student will create a three-dimensional model from a topographical map and discover that water flows perpendicular to the contour lines on a topographical map.

Applicability

Any earth science or geography course at the junior high level. It may serve as a review of map skills at the high school level for more advanced classes. At the junior high level it may be used to introduce students to the concept of topographic contours.

Materials

Cardboard, scissors, glue and a simple topographical map (see figure 1).

Time Two or three days.

Procedure

This is best done as a group activity. Groups of four seem to work out best. Each group will produce one /model. Students begin by cutting out an 8 1/2 x 11 inch base plate. Avoid using cardboard that is too thick for the type scissors available. Next, each student constructs one topographical feature. They begin by cutting up the topographical map into the separate features. Then they cut out each feature along the lowest (outermost) contour line. This shape is then traced on a piece of cardboard and cut out. This piece is then glued to the baseplate in its correct position. Then, the student cuts their topographical feature along the next lowest line. They trace this on another piece of cardboard and cut it out. This piece is then glued on top of the last piece. This process is repeated until all the contour lines have been modeled. You may wish to have additional copies of the topographical maps available for use as a guide. I merely copied this map from our earth science textbook. This enabled the students to use their text as a guide. You may or may not wish to show the students a completed model as an additional guide.

Once students have assembled their model ask them to draw arrows on the topographical features to indicate the direction that they think water will flow. Students should point out that water flows downhill. Then, have them indicate possible stream courses with thick solid lines on the baseplate. Now comes the critical part of the lesson. Compare a model and a topographical map and ask how does the direction of surface water flow on the model compare with the direction of surface water flow on the topographical map. Students should see that water flows perpendicular to the contour lines although they probably won't use the term perpendicular.

Mapping Surface and Alluvial Groundwater Flows and Pollution on a Topographical Map

Objective

The student will map surface and alluvial groundwater flow and pollution on a topographical map.

Applicability

Any secondary level geography or earth science class. This activity should only be used after students have mastered most other map skills and the reading of topographical contours in particular as outlined in the previous lesson.

Materials

Laminated 7.5 minute topographical maps of the local area that show the source of their water supply and overhead marking pens. These maps should show the municipal water reservoirs or wells that serve as the source of their drinking water. In rural areas each home may have its own well. In this case, maps showing the school's or local municipality's well would be sufficient. In some cases, maps of the surrounding areas may be useful if they show sources of pollution.

Time One or two days.

Procedure

Once students understand that water flows perpendicular to contour lines they can trace surface water flows. They can trace alluvial groundwater flow as well. This is possible because, first of all, most groundwater movement occurs in the uppermost or alluvial aquifer. Secondly, alluvial groundwater flow generally follows surface contours and finally, most groundwater pollution also occurs in the alluvial aquifer.

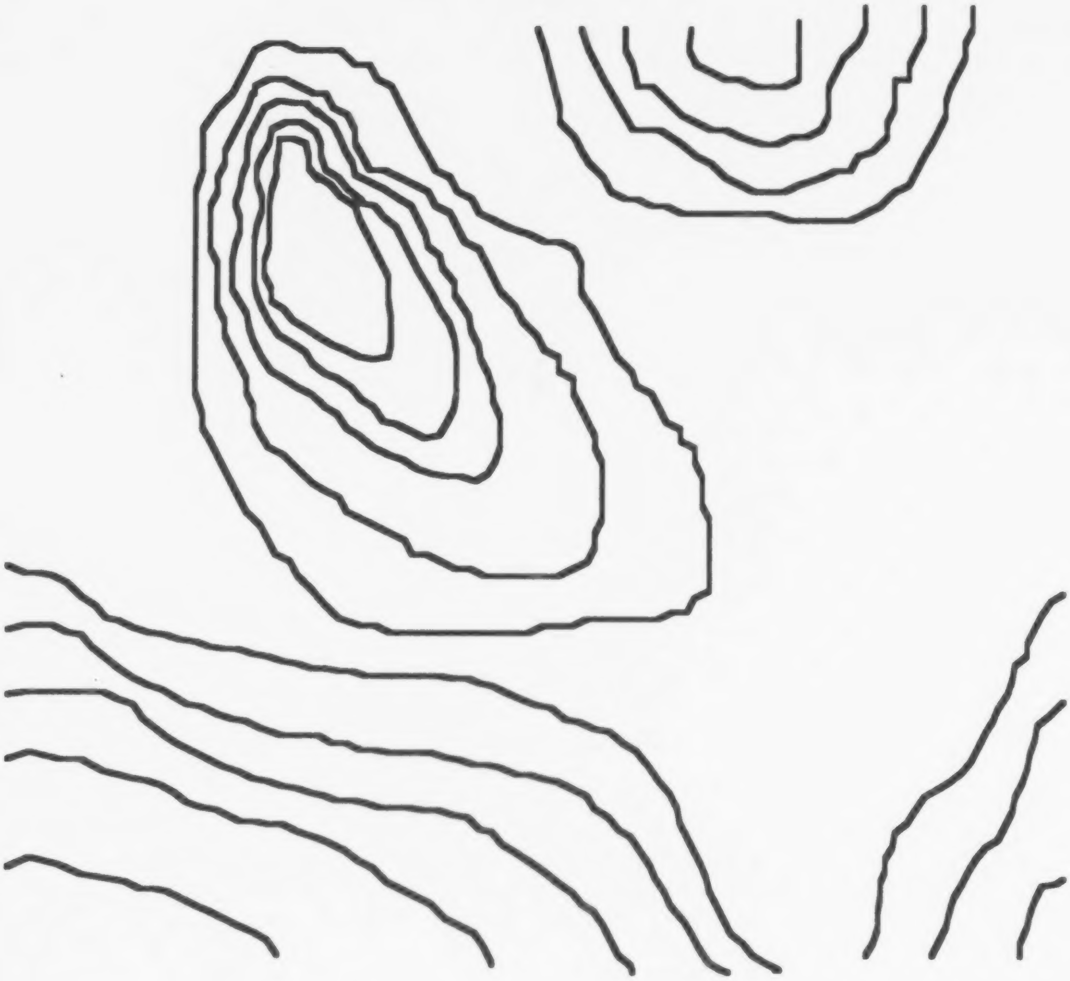
Once again have the students get into groups. Groups of four seem to work the best. However, depending on how many maps you have available you may need to adjust the size of the groups. Next, distribute the laminated maps and the overhead marking pens. You may want to have more than one color available or you may just have the groups trade pens if they wish to indulge in multi-colored splendor.

Begin this activity by having students examine the maps for possible sources of pollution. These sources may include landfills, mines, oil drilling rights or any industrial site suspected of polluting the water. Local newspapers are an excellent source of information on this subject. In rural areas feedlots and runoff from fields treated with pesticides may also be considered. In urban areas the underground storage tanks of gas stations may also be of interest. Military and other federal installations are often a source of water pollution. These potential sources of contamination should be listed on the blackboard and students should take note of them.

Once the sources of contamination have been identified the students should then draw arrows to indicate the direction of surface and groundwater flow near the source of pollution. In most cases this will eventually lead to surface streams. These streams may flow year round or intermittently. It should be pointed out to the students that even if no water is flowing on the surface the alluvial aquifers are often quite extensive along streambeds and usually the groundwater will then follow these streambeds. Students should continue to plot the movement of the pollution until the edge of the map is reached. Once the students have had a chance to complete this stage of the activity you should ask them either as a class or in their groups to identify the pollutant pathways. They should describe the pathways from the source of pollution to any streambeds or other bodies of water it may encounter. Students may need some help in describing the pathways. If these pollutant pathways, either on the surface or below ground, lead to a water reservoir or municipal well site, potential threats to the quality of local drinking water supplies can be identified. It is usually better to let students discover the location of the municipal water supply on their own so as to not bias their findings. If the students don't discover this on their own, the source of their drinking water should then be identified for them. This information can be obtained from the local newspapers or by contacting the office of the city manager. You may also wish to point out the location of wetlands or other areas of environmental sensitivity.

This activity could even be coordinated with science classes. Field trips to gather water samples for analysis would make an excellent extension activity. The location for sampling could be plotted in the earth science or geography classes. The samples could then be gathered by biology or chemistry classes. The samples could then be analyzed either chemically or with the use of biological specimens such as simple invertebrates. A note of caution: such activities usually are expensive and could be hazardous if serious pollution problems are encountered. You may wish to consult your local public health officials. Your local public health officials could be an excellent source of information in any case.

Figure 1



THE GOOD, THE BAD, THE MISERABLE -- QUALITY OF LIFE

JUNIOR HIGH

This research activity is intended to acquaint the students with the differences in quality of life throughout the world. Students will complete basic statistical research on a country. This information will be analyzed so that conclusions can be drawn on this topic.

Marsha Slater
Northeast Junior High
Northglenn, Colorado

Objectives

Students will:

1. Use reference materials to acquire statistical information.
2. Orally present information for discussion.
3. Use critical thinking skills to draw conclusions.
4. Draw conclusions as to the quality of life in countries studied.

Grade Level 7 and up

Time Period 3 class periods

Geographic Theme Location, Region

Student Materials

One blank fact sheet per student

Library reference materials, almanacs and encyclopedias are particularly informative. Data from the World Bank is especially useful.

U.S. Fact Sheets

Teacher Materials

Sample Data Gathering Sheet

International Index of Human Suffering from "U.S. Ranks Low in Misery" from the Rocky Mountain News, March 16, 1987.

Procedure

1. Give each student a blank copy of the fact sheet.
2. Have students pick a country (or assign countries) from the list below. Be sure to have approximately the same number of best and worst countries. Do not reveal this ranking to the students.

Worst	Best
Mozambique	Switzerland
Angola	West Germany
Afghanistan	Luxembourg
Chad	Netherlands
Mali	Belgium
Ghana	Canada
Somalia	Austria
Niger	Denmark
Burkina Faso	Japan
Central African Republic	Sweden
Zaire	United Kingdom
Benin	France
Malawi	Norway
Guinea	East Germany
Ethiopia	

3. Students study their countries. They should be able to find most of the statistics.

4. After their study, students answer the questions below. Give each student a U.S. Fact Sheet to be used for comparison.

a. From the information sheet and the U.S. Fact Sheet, decide if your country has a high or low quality of life.

b. List the factors that you feel support your decision.

5. The next step is to collect the data and come to a class consensus on what determines high or low quality of life. Use the sheet provided as a model. Make an overhead transparency to project the chart. Write the names of the countries at the top. Have each student supply the necessary information. Check the appropriate box.

6. After all information has been gathered, the class needs to draw conclusions. Ask:

a. In what hemisphere are low quality of life countries found?

b. In what hemisphere are high quality of life countries found?

c. What are the characteristics of a country with a low quality of life?

d. What are the characteristics of a country with a high quality of life?

e. Does there seem to be a relationship (what is it?) between quality of life and . . .

amount of natural resources
population growth
low GNP
life expectancy
percent employed in agriculture
percent employed in industry
percent urban
percent rural
infant morality
literacy
war
low per capita income

7. Students should recognize that countries with a low quality of life often have these characteristics:

southern hemisphere
few natural resources
high population growth rates
low life expectancy
illiteracy
high percent employed in agriculture
rural communities
high infant mortality
possible war or civil war
low per capita income
low per capita energy use

8. Conversely, high quality of life countries usually have opposite responses.

Evaluation

1. Teacher evaluation of individual packets.

2. Written assignment. Ask students to describe life in a country with a low quality of life. Compare it with the U.S.

Extension Reading "What Is It Like To Be Poor" by Robert Heilbroner, from The Great Ascent: The Struggle For Economic Development in Our Time, 1963. Harper and Row, Publishers.

QUALITY OF LIFE FACT SHEET Name: ______________________

Country:
Continent:
Location (landlocked, hemisphere, coastal, etc.):
Latitude and longitude of capital:
Topography:
Climate:
Natural Resources:
Life Expectancy:
Population:
Infant Mortality:
Population Growth rate:
Percent Urban:
Percent Rural:
GNP per capita:
Inflation rate:
Labor
 Percent agriculture:
 Percent manufacturing:
Literacy rate:
Crops:
Industry:
Energy use:
 (per capita or percent worldwide use)
Imports:
Exports:
War (Civil war or general):
Other facts:
 (food consumption, percent growth, etc.)

QUALITY OF LIFE FACT SHEET

Country: United States of America

Continent: North America

Location (landlocked, hemisphere, coastal, etc.): Northern and Western hemisphere, coast on Atlantic and Pacific Oceans

Latitude and longitude of capital: Washington, D.C.: 38.50° N, 77.00° W.

Topography: Varied - coastal plains, central plains, mountains, desert

Climate: Varied - sub-tropical, Mediterranean, humid continental, semi-arid, desert

Natural Resources: coal, oil, copper, gold, minerals, water

Life Expectancy: average 73.9

Population: 241 million

Infant Mortality: 10.6 per 1000 births

Population Growth rate: 0.7%

Percent Urban: 79.2%

Percent Rural: 20.8%

GNP per capita: $13,451

Inflation rate: 1986 - 3%

Labor

- Percent agriculture: 2.7%
- Percent manufacturing:

Literacy rate: 99.5%

Crops: corn, wheat, barley, oats, sugar, potatoes, beef, pork

Industry: petroleum, fertilizer, cement, iron, steel, plastics, motor vehicles, electricity

Energy use (per capita or percent worldwide use): 11626 kilograms coal equivalent per capita

Imports: petroleum, machinery, automobiles

Exports: machinery, chemicals, aircraft, military equipment, cereals, motor vehicles

War (Civil war or general): none

Other facts (food consumption, percent growth, etc.):

THE GOOD, THE BAD, AND THE MISERABLE -- QUALITY OF LIFE

International Index of Human Suffering*

The Higher The Number, the Greater the Misery

The Index is a numerical composite of a variety of measurements of the quality of life in different countries.

In each category, countries were rated between zero and 10 with increasing numbers representing increasing human suffering. The maximum score would be 100, the minimum zero.

Worst		Best	
Mozambique	95	Switzerland	4
Angola	91	West Germany	5
Afghanistan	88	Luxembourg	6
Chad	88	Netherlands	7
Mali	88	United States	8
Ghana	87	Belgium	9
Somalia	87	Canada	9
Niger	85	Austria	9
Burkina Faso	84	Denmark	9
Central African Republic	84	Japan	11
Zaire	84	Sweden	12
Benin	83	United Kingdom	12
Malawi	83	France	14
Guinea	82	Norway	14
Ethiopia	82	East Germany	15

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*Source: "U.S. Ranks Low in Misery," Rocky Mountain News, March 16, 1987.

Sample Data Gathering Sheet

Characteristics	Country	Country	Country	Country	Country	Country
North Hemisphere						
South hemisphere						
Difficult terrain						
Land locked						
Few resources						
Many resources						
Low life expectancy						
High life expectancy						
Low infant mortality						
High infant mortality						
Low population growth						
High population growth						
Low GNP per capita						
High GNP per capita						
High % in agriculture						
Low % in agriculture						
Urban						
Rural						
Low % industry						
High % industry						
Low literacy						
High literacy						
Low energy use						
High energy use						
war						
High quality						
Low quality						

HOME SWEET HOME

JUNIORHIGH

This activity involves several basic geographic concepts and illustrates their interrelatedness. Everyone has an idea of an ideal place they would like to live. Students will examine their choices geographically. Students need to have knowledge of latitude and longitude and atlas use.

Marsha Slater
Northeast Junior High
Northglenn, Colorado

Objectives

Students will:
1. Reinforce atlas skills to gather information.
2. Locate places with latitude and longitude.
3. Demonstrate knowledge of the interrelatedness of latitude, climate, and vegetation.

Grade level 7 and up

Time Period 2-3 days

Geographic Themes Location and Place

Student Materials

Home Sweet Home Questionnaire
Home Sweet Home - Latitude and Longitude Worksheet
Home Sweet Home - Your Place

Teacher Materials Answer Sheet for Home Sweet Home - Latitude and Longitude Worksheet

Procedures

1. Give a copy of the questionnaire to each student. After completion, they are to set these aside for future use.

2. Give each student a latitude and longitude worksheet and an atlas. They are to fill out the sheet. This will be used in the next step.

3. Give students the Home Sweet Home - Your Place worksheet. Using an atlas, the latitude/longitude chart, and the questionnaire, students are to choose one place listed which most closely resembles their ideal place. Students complete the sheet as directed.

4. Teacher directed discussion of activity. Concepts to be emphasized are:

The relationship between latitude and climate. It is generally warmer near the equator or in the low latitudes and colder away from the equator or high latitudes. The relationship between climate and vegetation. Cite examples from the atlas such as tropical forests are not found in Canada, sub-zero temperatures are not found along the equator, and deserts are not found in places with high precipitation. The relationship between climate, topography and population density. People settle in areas where it is easiest to live. Notice that high densities of population occur on plains and near rivers, not in the middle of deserts and high mountains. Point out the existence of broad climatic belts based on latitude.

Evaluation Teacher evaluation of latitude and longitude charts and Home Sweet Home - Your Place sheets.

HOME SWEET HOME QUESTIONNAIRE

Name: ____________________

Directions You need to consider the type of place you would most like to live. Fill in the questionnaire below. This will be used later in the assignment.

Climate

1. How many seasons would you like? (check 1)

____ 1 ____ 2 ____ 3 ____ 4

2. What kinds of seasons would you like? (check as many as the number of seasons checked above)

____ cold and wet
____ mild and wet
____ hot and wet
____ cold and dry
____ mild and dry
____ hot and dry

Vegetation (check 1)

____ tundra
____ grassland
____ desert grasses and shrubs
____ evergreen forest
____ deciduous forest

HOME SWEET HOME - LATITUDE AND LONGITUDE WORKSHEET

Name: ____________________

Use an atlas to find the latitude and longitude information below:

Group 1

1. Murmansk USSR
2. Hopedale, Newfoundland, Canada
3. Godhaven, Greenland
4. Fairbanks, Alaska
5. Nome, Alaska

N-S range of latitude
Type(s) of climate
Description(s) of climate
Vegetation types

Group 2

1. Wellington, New Zealand
2. Halifax, Nova Scotia, Canada
3. Vancouver, Canada
4. Paris, France
5. Chicago, Illinois

N-S range of latitude
Type(s) of climate
Description(s) of climate
Vegetation types

Group 3

1. San Diego, California
2. Adelaide, Australia
3. Istanbul, Turkey
4. Cape Town, South Africa
5. Valparaiso, Chile

N-S range of latitude
Type(s) of climate
Description(s) of climate
Vegetation types

Group 4

1. Tombouctou (Timbuktu), Mali
2. Alice Springs, Australia
3. Phoenix, Arizona
4. Tashkent, USSR
5. Comodoro Rivadavia, Argentina

N-S range of latitude

Type(s) of climate

Description(s) of climate

Vegetation types

Group 5

1. Belem, Brazil
2. Jakarta, Indonesia
3. Moramang, Madagascar
4. Colombo, Sri Lanka
5. Rangoon, Thailand

N-S range of latitude

Type(s) of climate

Description(s) of climate

Vegetation types

HOME SWEET HOME - LATITUDE AND LONGITUDE WORKSHEET

Name: Key (+ or - 1 degree)

Use an atlas to find the latitude and longitude information below.

Group 1

1. Murmansk USSR	68N 32E
2. Hopedale, Newfoundland, Canada	56N 60W
3. Godhaven, Greenland	68N 54W
4. Fairbanks, Alaska	59N 147W
5. Nome, Alaska	64N 166W
N-S range of latitude	56N - 68N
Type(s) of climate	Arctic, high latitudes
Description(s) of climate	cold, dry, short growing season
Vegetation types	tundra, forest

HOME SWEET HOME

Group 2

1. Wellington, New Zealand	42S 175E
2. Halifax, Nova Scotia, Canada	44N 64W
3. Vancouver, Canada	49N 123W
4. Paris, France	48N 3E
5. Chicago, Illinois	42N 87W
N-S range of latitude	42S - 49N
Type(s) of climate	humid Continental, Marine
Description(s) of climate	varied percipitation, four season, wet
Vegetation types	tundra, forest

Group 3

1. San Diego, California	33N 118W
2. Adelaide, Australia	35S 138E
3. Istanbul, Turkey	41N 38E
4. Cape Town, South Africa	34S 19E
5. Valparaiso, Chile	35S 72W
N-S range of latitude	35S - 41N
Type(s) of climate	Mediterranean
Description(s) of climate	hot, dry summers, mild, wet winters
Vegetation types	shrub woodland grassland

Group 4

1. Tombouctou (Timbuktu), Mali	17N 3W
2. Alice Springs, Australia	23S 134E
3. Pheonix, Arizona	33N 112W
4. Tashkent, USSR	42N 69E
5. Comodoro Rivadavia, Argentina	45S 67W
N-S range of latitude	45S - 42N
Type(s) of climate	desert, semi-arid
Description(s) of climate	dry, hot
Vegetation types	desert grasses and shrubs

Group 5

1. Belem, Brazil	1S 48W
2. Jakarta, Indonesia	7S 107E
3. Moramang, Madagascar	19S 48E
4. Colombo, Sri Lanka	7N 80E
5. Ragoon, Thailand	17N 96E
N-S range of latitude	19S - 17N
Type(s) of climate	humid low latitude, tropical
Description(s) of climate	tropical, wet, hot
Vegetation types	broadleaf forest and evergreen, jungle

HOME SWEET HOME - YOUR PLACE

Name____________________

Directions: Use an atlas, the latitude/longitude chart, and your HOME SWEET HOME QUESTIONNAIRE to complete the questions below.

1. Which place on the latitude and longitude chart most closely resembles your ideal place as indicated by your questionnaire?

2. For the place you chose, give the following data:
   a. continent on which it is located
   b. latitude and longitude
   c. climate type
   d. temperature averages for: January ____ July ____
   e. precipitation in inches
   f. topography
   g. vegetation
   h. population density
   i. describe the clothes one would need in this area
   j. on the back of this paper, draw a picture of the type of housing one would need at this location. You must use materials found in the area or produced from materials there.

3. For each of the four remaining groups, explain what climatic characteristics you did not like.

GIVE ME FIVE

JUNIORHIGH

This activity uses a thematic approach to the study of a cultural region. National Geographic magazines and the five themes of geography from the Guidelines for Geographic Education are used to interpret an article. Students need to have a general knowledge of the five themes. The themes may be introduced or reviewed by using "Maps, The Landscape, and Fundamental Themes in Geography," published by the National Geographic Society. This activity is an excellent culminating activity to the study of the five themes.

Marsha Slater
Northeast Junior High
Northglenn, Colorado

Objectives

The students will:

1. Distinguish between the five themes.
2. Analyze an article in National Geographic using the five themes.
3. Understand the interrelatedness of the five themes.
4. Create a pictorial template of their geographic analysis.
5. Orally present their thematic analysis.

Grade Level 7 and up

Time period 2-3 class periods

Geographic Themes all

Materials

One National Geographic magazine per student
One question sheet per student
Construction paper or butcher paper
Scissors
Glue
Marking pens

Procedure

1. Supply students with a National Geographic magazine or article cut from National Geographic, and a question sheet.
2. Students read the article and answer the thematic questions. Note: Due to the variety of articles, not all questions may be answered. Students should be instructed to cover the questions the best that they can.
3. After the research, each student will produce a geographic template of their region. Using construction paper and supplies students will pictorially display their topic. Each geography theme needs to be addressed. For each theme, a picture from the article is to be used to demonstrate that theme. The question sheet is to be attached to the back of the template.
4. Students orally summarize the five themes and their topics.
5. Pictorial templates can be displayed around the room.

Give Me Five Question Sheet

Title of article:

Date of National Geographic:

Country or region:

Location

What is the latitude and longitude range?

What is the relative location (hemisphere, neighboring countries, landforms)?

What are the major land and water forms?

What is the climate?

How would the location of this area affect the cultural activities?

Place

What are the distinctive physical characteristics?

What are the distinctive cultural characteristics?

What physical processes (erosion, flood, volcanic, wind) have shaped this place?

How do people view this place? (or what feelings do they have for this area?)

Human-Environment Interactions

Describe how people have changed the environment.

Why were changes made to the environment?

What were the results of these changes? Have they been positive or negative?

What technology was used to make these changes?

Movement

Describe the transportation system.

Describe the communication system.

How do people depend on other areas? Give examples of imports and exports.

How is the area interdependent?

Regions

Are there distinct cultural regions (i.e. minority groups, language, religions, ethnic groups)?

Describe distinct physical regions.

How do the cultural and/or physical regions vary in size?

Make a general statement that describes one region.

Is this place part of another region? If so, explain the relationship.

MIDDLE EAST SIMULATION

JUNIORHIGH

In the complex negotiations that have been made possible by Israel's gains in the Six Day War and that will ultimately lead to peace in the Middle East, the questions have always been of land and rights and boundaries. Ultimately there is the question of power. Wherever the boundary lines are drawn, any settlement with its consequent changes in military power, demographic homogeneity, social, political and economic opportunities is very controversial and is currently hotly debated in Israeli politics. The problems are complex. Problem solving through a simulation fulfills the need for a student to learn to work with scientific methods as well as to use geography as a subject providing information needed to make skilled and informed decisions. This approach expands a student's appreciation for multiple causality and the consequent alternative decisions.

A. O. Forbes
Colorado Rocky Mountain School
Carbondale, Colorado

Teacher Directions—Overview

The simulation asks students to utilize accumulated information, gather new information through research, and apply their information to evaluate future Israeli policy concerning the Gaza Strip and the West Bank area.

The simulation asks students to assume roles of key characters in the Middle East. Students choose roles and research and define these roles to gain current insights and a historical perspective on the character (both physical and cultural) of the country or people they represent. Once the roles are developed, students are given the actual political conditions that existed in the Middle East in October 1973. Students then determine objectives for their role (based on previous study) and create strategies for accomplishing these objectives. Students role play, interacting through a structured format, attempting to accomplish their objectives. At the game's conclusion, the students will have created their own historical sequence based on their own decision making. After describing and discussing all the activities in the simulation, students are then asked to check the actual historical sequence from 1973 to the present, and to compare these events to their simulated events. Similarities, differences are examined and are discussed in detail to illuminate the complexity of the situation. To conclude the activity students are presented with the current dilemma concerning the future sovereignty of the occupied territories. Students realize that the current territorial issue here is the result of previous historical events and in this aspect the simulation generates an understanding and an empathy for all the ramifications of previous decisions. Students are split into the political parties, the Likud Party and the Ashkenazi and learn the platforms for their party. A debate is then staged, with each side providing what they feel to be the best solutions to their territorial question. Students start to see that the national character of Israel, the purity of Zionist ideals, the level of and presence of civil rights is all very powerfully influenced by the decisions over the future of the West Bank and to a lesser extent the Gaza Strip. Other current issues are introduced and can be integrated with the historical aspects previously described in the simulation. The simulation provides incentive and generates great curiosity and desire to discover what really happened. There are numerous opportunities to disseminate 'information' to the class either through small mini-lectures, editorials, or through information given to individual roles.

The activity sequence can be completed in ten days. The schedule that follows can be augmented or diminished to fit the ability or purpose of the class.

Timeline Overview

1. Anticipatory set. Transition and introduction of simulation

2. Role selection

3. Role development

4. Simulation

5. Comparison and analysis. Debrief simulation.

6. Debate future policy.

7. Implications for future

Grading and Accounting

1. Self grade - participation
2. Individual assignments
3. Group journals
4. Exam

Rules of simulation and Procedures

1. Room is arranged to promote separation, to prevent communication except through arranged methods. Simulates geographic distance.

2. Tables representing countries (roles) must be identified by flag or label etc. and must always have someone home to welcome and confer with visiting diplomats.

3. Representatives may travel from country to country during the prescribed times if the receiving country agrees to welcome them.

4. Game is divided into rounds. Rounds last 15 minutes. Countries plan moves, confer with other countries, and make agreements that promote their objectives. A round ends exactly at the end of 15 minutes and a 10-minute period begins where countries discuss and plan and determine new objectives for next round. During this period, no communication between countries is allowed except through media announcements. At this point countries should be recording everything that went on, copying agreements, news breaks, etc. to later put in their journals. A complete record of what went on is needed and should be labeled under Round 1. (Often students find time too short, but this is realistic and students should be made to adhere to a time schedule, which makes for fast-paced high energy interactions). Also, they can only communicate through their representatives at the appropriate times.

5. At the conclusion of each round each country must make a move in writing declaring actions or intentions of actions and present this to the group via the media. For example, Egypt has agreed to sell cotton to the USSR in exchange for military advice and support.

6. Media. Media makes announcements at the end of every round. Media can be used to disseminate accurate information or to propagandize. A media interviewer gathers data, reports incidents, and editorializes at will. A competent group of students can control much of the interaction if given this role.

Daily Directions

Day 1: Introduce students to specific activity. Explain the focus and purpose of the next weeks' activities and provide anticipatory set.
Homework:

Day 2: Roles are selected and students find information relevant to their roles. Students should be able to provide a complete profile of their country. An outline is provided. Data base programs, atlas, almanacs, etc. can be used to secure the information.

Homework:

Day 3: Students write objectives and devise strategies to accomplish these, based on previous study. For example, an objective that Egypt wants the withdrawal of Israeli troops from Sinai might call for the strategy that an agreement would guarantee Israeli security on the southern border with Egypt, to be signed upon the withdrawal of troops. Ask for assistance from one of the superpowers.

Homework:

Day 4: Rules of the game are presented and/or reviewed Room is arranged and game begins.

Homework:

Day 5 & 6: Simulation is played as long as teacher feels interaction is worthwhile. In cases of military conflict, teacher is decision-maker and can make "realistic" decisions based on the information a country can provide as to amount of military resources, terrain, etc. and other important considerations. I discourage these and encourage students to explore other methods.

Homework: Read chronology of events.

Day 7: Hold a class discussion on the actual events versus the simulation. Compare actual historical chronology to students' interaction. Journals are used to illuminate students' versions. Debrief simulation asking about realistic vs. non-realistic actions on part of students, personality of key people, similarities vs. differences, etc.
Homework:

Day 8: Debate (Likud vs. Ashkenazi Party platforms). Introduce the topics of the future of the West Bank. Divide class into political parties and provide them with information (platforms). Allow students to study and prepare their arguments.

Day 9: Debate: Students present their arguments to each other or (even better) an audience. A sample vote can be taken to evaluate persuasiveness or arguments.
Homework: Personal statement and preference concerning situation.

Day 10: Summary of debate and its application to current situations. Personalize information and students can interview parents or locals in town or city.

Middle East Simulation
Purpose and Rules

1. Study to determine roles of the following:
    Egypt
    Israel
    Saudi Arabia
    Syria
    Jordan
    Lebanon
    United States
    USSR
    PLO
    Terrorist groups
    Media

2. Determine and explain objectives:
    a. Write objectives:
        —to define the purpose of the game (success of objectives)
        —sensitive to the needs of the country
    b. Strategy—the ways to achieve the objectives.

3. Explain rules
    a. Room setup rules — represent time and space constraints
    b. 15-minute rounds to plan moves, talk to other countries, work towards achieving objectives.
    c. At the end of 15 minutes, must act (in writing) to declare actions or intentions and present them to the group. Examples: (1) Egypt has agreed to buy military arms from USSR in exchange for cotton; (2) Egypt wishes to withhold any formal statement at this time.
    d. Media: remember that media can sometimes publish falsely, and that they can announce or publish anytime. Examples from actual editorials.

Situation as Game Begins

1. Israel holds the territory taken during wars (see map)
2. Arabs are discussing their future plans for oil, and already have used it as a lever to break down U.S. support of Israel
3. Terrorist activity is ongoing
4. Israel discovers oil in the occupied territory of the Sinai peninsula
5. U.S. and USSR continue to support each side and are working on talks on arms and trade
6. Neither the Israelis nor the Arabs are satisfied with the present situation but neither will give in to meet other sides' demands

Problems

1. Israel wants to negotiate first and withdraw later
2. Arabs want withdrawal first and negotiations later
3. The US and USSR may (or may not work) together

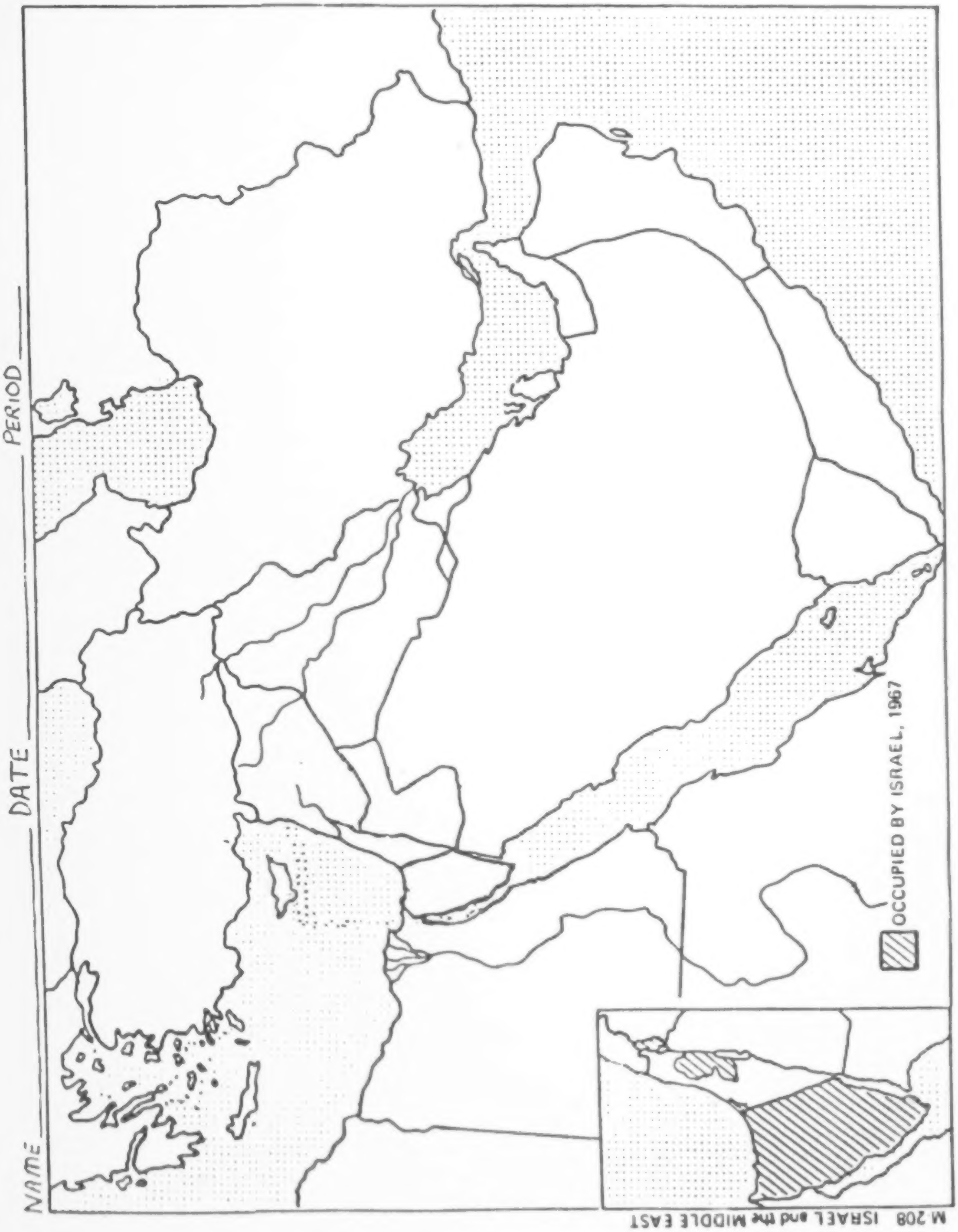
Possible Objectives

Arabs

1. Withdrawal of Israel from occupied lands
2. Suez Canal
3. Israel to settle Arab refugees uprooted in war
4. Jerusalem
5. Support from US
6. Peace
7. Arab Unity

Israelis

1. Arab recognition of Israel as state
2. Freedom of passage through Suez Canal
3. End terrorism
4. Jerusalem
5. Support from US
6. Peace


NAME
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M 208 ISRAEL and the MIDDLE EAST

AIR POLLUTION IN THE WEST

JUNIOR HIGH

This topic illustrates the geographical themes of location, and human-environmental interaction. We begin by investigating what air pollution is, both physically and perceptually. Then we suggest ways by which the problem, or potential problem, differs between the Eastern and the Western United States. Detailed insights are gained by looking at air quality problems of Vail and Denver. In addition, we investigate, in an interactive way, some of the geographical considerations of the problem of acid rain in the United States. Finally, we offer classroom demonstrations concerning temperature inversions, the collection of pollutants, and the social geography of air quality.

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The Nature of Air Pollution

What is Air Pollution?

Strictly speaking air pollution is the state of the atmosphere that occurs when it contains substances in quantities exceeding those for the natural atmosphere (Table 1). This definition is found wanting when we consider certain geographical aspects and human perception.

Table 1. The composition of dry air below 25 kilometers in terms of the percentage of total volume.

Constituent	Chemical Symbol	Content
Nitrogen	N_2	78.08
Oxygen	O_2	20.95
Argon	A	0.93
Carbon Dioxide	CO_2	0.03
TOTAL		99.99+

The topic of air pollution has two important aspects of a classical geographical problem. First, it has a lot to do with space. Pollutants are usually emitted in one place and then spread to another. The people who are subject to the pollution are also distributed . For example, most of the pollution in St. Louis, Missouri, occurs where the income of the people is lower than the average for the city. Second, air pollution is directly concerned with the interaction of humans with their environment (your class might want to discuss whether there can be air pollution if there are no people). People are largely responsible for air pollution and also suffer greatly from it.

Differences Between the East and West

One of the prime geographical issues concerning air pollution in the United States is the fact that there are many regional differences in the problem. Nevertheless, Federal air quality laws, specifically the Clean Air Act , have to apply nationwide.

Some important regional differences include dustiness, alkalinity of the soils, elevation, recreation type especially ski resorts, and lifestyles (woodburning stoves), amount of precipitation for pollutant scavenging.

Dustiness

The West is much dustier than the East. This gives rise to the potential for dust storms, which have been known to close highways due to poor visibility. It also means that the West finds it more difficult than the east to meet Total Suspended Particulates air quality standards. It is also a fact that much of this dust is alkaline in nature and it can thus neutralize some of the acid in potentially acid precipitation.

Alkalinity of Soils

Except for some of the alpine areas, much of the soil in Western localities is alkaline in nature. Acid rain falling on this soil will be quickly neutralized and even may benefit from such events. Thus the problem of acid rain is not so pressing in the West except for parts of the delicate alpine ecosystems.

Elevation

Much of the West is higher in elevation that the East. The principal effect this has on air quality is that less complete combustion takes place in the western air. Consequently, if it were not for more efficient emission controls, automobiles would put far greater amounts of pollutants into the air.

Recreation and Lifestyles

Western ski resorts tend to be built in valleys. All valleys are potential pollution traps due to cold air drainage. It is fashionable in western ski resorts along with other western towns to have wood burning fire places and stoves. Although these exist in the east they do not take on quite the importance in the quality context that they do in the West. The Council on Environmental Quality Report for 1983 singles out the states of Washington, Oregon, Colorado, New Mexico, and Montana as having problems with wood burning stoves, a problem that did not exist severely when the Clean Air Act and its Amendments of 1970 were passed.

Precipitation Scavenging

The principal way the atmosphere is cleansed is by precipitation washing out pollutants . The West has much less precipitation than the East and thus its atmospheric pollutants tend to stay in the air longer and dry deposition is more important. The type of precipitation is also important. It is found the snow scavenges out alkaline dust better than sulfur and nitrogen compounds. The latter are still found in the air when it arrives at high altitudes over the alpine tundra thus increasing the possibility for acidity in alpine precipitation in the winter.

Population Density

The population density in the West is not as great as in the East. This has two immediate results. First, there are not so many people engaged in industry and other emission producing activities. Second, there are not so many people to suffer from pollution than in the East. However, certain Western urban metropolitan areas have comparable air quality problems and as many people at risk as many places in the rest of the country.

Air Quality in Vail and Denver

Vail

The example of Vail is taken to illustrate two items. First, the idea of an emissions inventory is introduced. (See the class exercise on auto emissions below.) Second, Vail is an example of a Western ski resort with a potential air quality problem.

Vail is a relatively typical Western ski resort with one exception, namely, it has an Interstate Highway running through it. This makes its emissions inventory interesting (Table 2). An emissions inventory is the first stage in any air quality maintenance plan. It is simply a list of the amounts of all the possible or important pollutants that a source puts out. Note, for Vail, the high amounts of CO from both mobile sources and from woodburning fire-places. Both of these sources have to be carefully controlled if the quality of the "Western Ski Experience" is to be maintained.

Denver

One of many possible air quality issues in Denver is highlighted to emphasize the geographical nature of the problem. A geographical analysis can pinpoint segments of the population that are disproportionately exposed to potential health hazards. There are temporal trends in the spatial distribution of total suspended particulates or dust (Fig. 1). can be seen. These may not be the same as temporal trends observed at one point. Maps of particular sectors of the population (Figs. 2-4) illustrate that, in Denver, higher concentrations of pollutants near the city center have a great effect on older people while if pollution spreads to the suburbs, it will have a larger effect on young people. Both of these segments of the population are at a higher medical risk from air pollution than other parts of the population. These spatial aspects of the problem should be taken into account when making new air quality regulations. (You could discuss with your class how this might be done.)

Geography of Acid Rain

Most people believe that acid rain is formed when oxides of sulfur and nitrogen are emitted from coal burning power stations and other sources and are chemically transformed to acid compounds while being transported along by the prevailing winds. The acidic compounds are mainly brought to earth by rain or snow. The major concern in the U.S. is the emission of the major sources from power stations in the Ohio Valley area and subsequent precipitation of the acid rain in the Northeastern U.S. and in Southeastern Canada.

Assuming these facts to be true, a class discussion could be centered around the development of a law that would lead to the lessening of the acid rain problem. The class must decide:

1. To whom should the law apply? - just the electric power industry, that part of it that uses coal burning power plants, other pollutant source producers like auto drivers.
2. Assuming the law calls for the use of devices that reduce the amount of pollutants, who should pay for the devices: the Ohio valley power plants, all eastern power plants, all plants in the country, the consumers of the electricity (in what geographic areas?), all federal taxpayers or some in limited geographic areas.

Attempts to answer these questions should raise and exemplify some interesting geographic and environmental questions.

The discussion could be extended by:

1. Pointing out that the West produces lower sulfur coal than the East and examining the implications of this. Assuming plants burn local coal, how does that affect the answers given in the previous discussion? Also what principles of economic geography come into play if it is suggested that the low sulfur coal is transported from the West to the East for use there?
2. Some acid rain may come to the Western U.S. from sources in Mexico. It arrives in Sweden from sources in Britain and Germany. Should there be an international law covering this problem? If so, how would it work?
3. Why do we burn coal anyway? What other sources of power production are there? What are the advantages and disadvantages of these other sources for the U.S., and for the world as a whole?

Temperature Inversion Demonstration

Purpose

To demonstrate a simple temperature inversion: what causes it, how it is destroyed and dissipated by convective heat flow, and its effects on air pollution.

Materials

1. Two transparent plastic tubes 45-50 cm long, at least 3 cm in diameter, with a 5 mm hole drilled approximately 5 cm from the base.
2. Plastic petri dishes (to be used as lids).
3. Two plastic pans or trays, no smaller than 17 cm x 8 cm x 4 cm.
4. Clamps to hold tubes upright in plastic trays.
5. Flashlight
6. Matches
7. Ice water
8. Hot water

Procedure

1. Place tubes upright in trays.
2. Pour ice water in one tray and hot water in the other to just below smoke hole.
3. Allow demonstration device to adjust sufficiently to temperature change (2-3 mins.).
4. Place petri dish on top of each tube as a lid.
5. Light a match, blow out and insert in smoke holes to add smoke to tubes.
6. Using a flashlight, in darkened room, observe amount of movement of smoke in tubes.
7. Remove lids gently and observe dissipation of smoke from tubes.
8. Discuss and interpret observations.
9. Discuss significance of temperature inversions in relation to air pollution.

Expected Results

The smoke in the cold tube should be relatively stable with a small amount of smoke escaping from the top of the tube.

The smoke in the hot tube should be much more active rising and falling in convection currents and rapidly escaping the tube.

Table 2. Base Year Emission Inventory (1973-74 Winter Season) (Tons/Season)

	FUEL COMBUSTION EMISSIONS						MOBILE SOURCE EMISSIONS			
Airshed	Woodburning		Natural Gas		LP Gas		Highway		Off-Highway	
	Part	CO	Part	CO	Part	CO	Part	CO	Part	CO
Bighorn	3.1	19.8	0.2	0.5	neg	neg	1.5	294.5	0	0
East Vail	0.7	4.4	0.1	0.2	0	0	0.9	281.2	0	0
Vail Village	18.7	120.7	2.6	5.2	0.2	0.2	3.0	769.7	0	0
West Vail	8.1	52.2	0.4	0.8	0.1	0.1	2.2	656.9	0	0
Minturn	1.7	11.0	0.2	0.3	neg	neg	0.7	210.5	0.5	2.9
Dowd-Avon	0.9	6.0	0	0	0	0	1.1	333.7	0.5	2.9
Avon	0	0	0	0	0.2	0.2	0.7	213.9	0.5	2.9
Avon-Edwards	0	0	0	0	neg	neg	0.8	252.2	0.5	2.9
Beaver Creek	0	0	0	0	0	0	0	0	0	0
TOTAL	33.2	214.1	3.5	7.0	0.5	0.5	10.9	3012.6	2.0	11.6

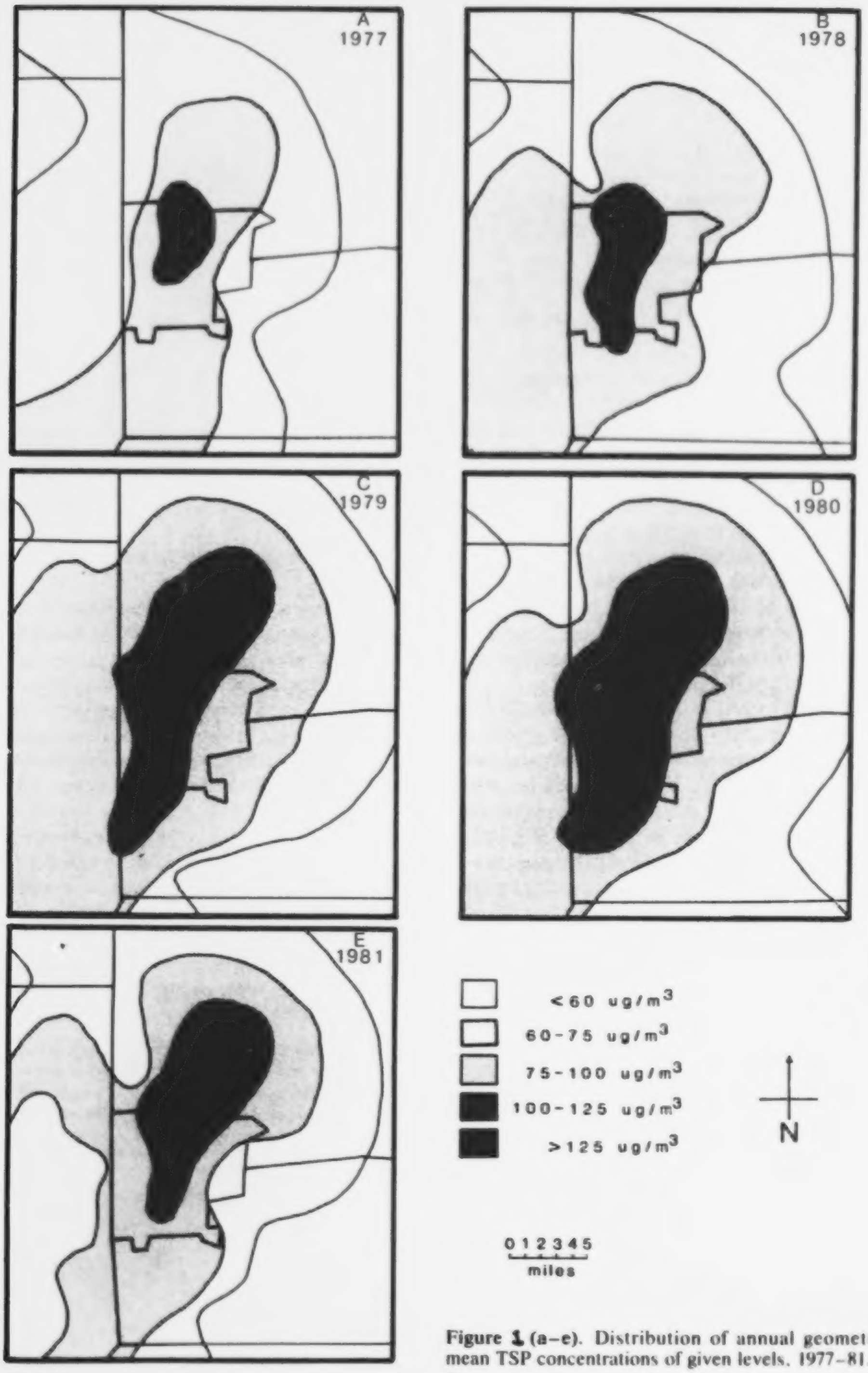
A
1977
B
1978
C
1979
D
1980
E
1981
< 60 ug/m³
60-75 ug/m³
75-100 ug/m³
100-125 ug/m³
>125 ug/m³
N
0 1 2 3 4 5
miles

Figure 1 (a–e). Distribution of annual geometric mean TSP concentrations of given levels, 1977–81.

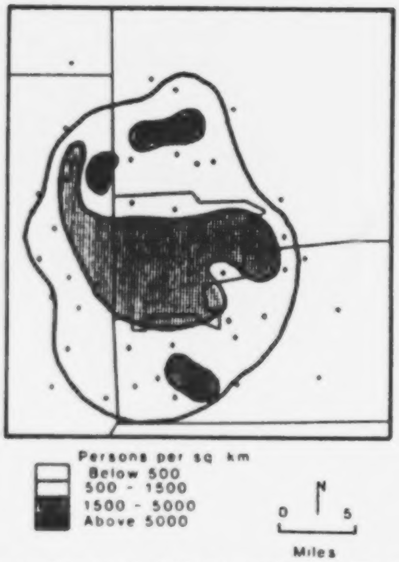
Persons per sq km
Below 500
500 - 1500
1500 - 5000
Above 5000
N
0
5
Miles

Figure 2. Population density (persons per square km) in the study area in 1980. Figures 2 through 4 show county boundaries generalized by computer; crosses indicate the receptor points used in the population exposure analysis.

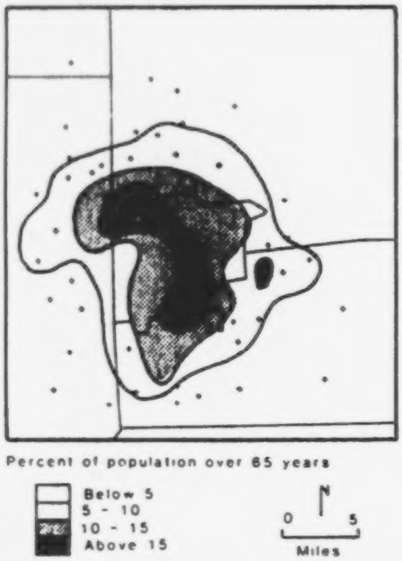
Percent of population over 65 years
Below 5
5 - 10
10 - 15
Above 15
N
0
5
Miles

Figure 3. Distribution of the percentage of population 65 years of age and older.

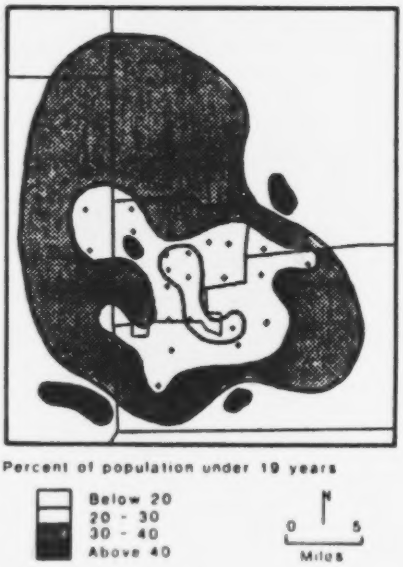
Percent of population under 19 years
Below 20
20 - 30
30 - 40
Above 40
N
0
5
Miles

Figure 4. Distribution of the percentage of population 19 years of age and younger.

Temperature Inversion Demonstration

Purpose

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Materials

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7. Remove lids gently and observe dissipation of smoke from tubes.
8. Discuss and interpret observations.
9. Discuss significance of temperature inversions in relation to air pollution.

Expected Results

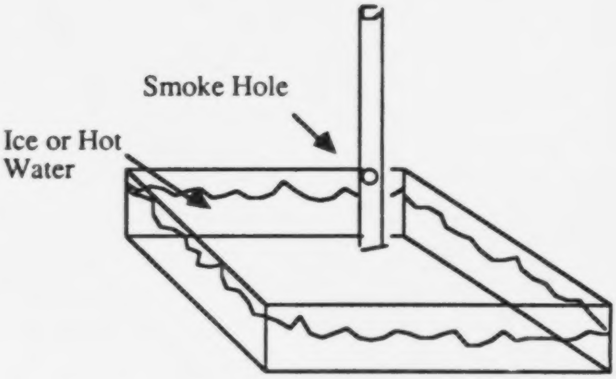
The smoke in the cold tube should be relatively stable with a small amount of smoke escaping from the top of the tube.

The smoke in the hot tube should be much more active rising and falling in convection currents and rapidly escaping the tube.

Equipment Suggestions

I built my own equipment from odds and ends in my stock room. Better (but more expensive) equipment can be purchased from Eduquip, 1220 Adams St., Boston, Mass. 02124, Phone: 617-298-0160.

I have found it best to use 2 sets of equipment. However, the demo works well with one set as long as you have a drain in the tray to change from cold to hot water without disturbing the smoke in the tubes.



Pollution Search-An Investigation

A. Acid Rain

Purpose

To collect samples of rain water, tap water and surface water, determine the acidity of the samples and compare to acid rain, clean rain and pure water samples.

Materials

1. Collection bottles with lids
2. Distilled water
3. pH paper
4. Hand magnifiers and/or microscopes
5. White vinegar

Procedure

1. Wash collection bottles, rinse with distilled water and air dry.
2. Collect as many samples of rainwater, tapwater and surface water (ponds, streams, ditches, puddles, etc.) as possible at school, at home and/or on field trips.
3. Seal and label samples.

4. Prepare water with different pH levels representative of conditions found throughout the US ranging from Distilled water- pH 6-7; Clean rain water- pH 5.5; Acid rain- pH 4-5. Do this by gradually adding vinegar to distilled water to each desired pH levels. This can be done beforehand by teacher or, as part of the exercise by the students.
5. Check pH of collected samples and compare with prepared samples.
6. Record results.
7. Look at water samples under magnification and record results.
8. Interpret observations, either in small groups or as a class.
9. Discuss causes and effects of acid rain and possible solutions to problem. (The idea for the acid rain exercise and parts of the procedure are borrowed from the National Geographic Society's nationwide curriculum project for elementary schools; Kid Network-Acid Rain).

B. Automobile Exhausts Emissions

Purpose

To collect samples of particulate matter from automobile exhaust pipes, investigate the samples, and determine effects on air pollution.

Materials

1. Paper towels
2. Rubber bands
3. Hand magnifiers and/or microscopes
4. Distilled water

Procedure

1. Borrow automobile keys from selected, willing teachers. Try to choose different age and models of cars.
2. Go to faculty parking lot and secure paper towels over end of exhaust pipes with rubber bands. (Steps 1 & 2 may also be done as homework using the family cars).
3. Start and run engine for 1-2 minutes.
4. Remove paper towels, label them and return to classroom.
5. Examine and compare samples under magnification.
6. Mix some scraping from the samples with 100 ml of distilled water and test pH.
7. Record observations.
8. Interpret observations either in small groups or as a class.
9. Discuss the part that particulates from car exhausts play in adding to air pollution.

C. Socio/Economic Surveys

After considerable discussion of the causes and effects and possible solutions to air pollution problems in the West, the students and teacher could design and implement surveys to determine the impact of lifestyle, attitudes, careers, etc. These surveys could be done within the school (staff and student) or be extended to home and community as well. It is important for students to see how complex and difficult it is to control air pollution and for them to be informed of the important roles they, along with all the rest of us, play in the whole process. The surveys, upon completion, will yield valuable discussion topics and lead to further studies and possibly some cross-discipline planning and teaching, i.e., science/ social studies/ geography.

BALANCING WESTERN WATER

JUNIOR HIGH

In this session we develop a deeper understanding of water in the West, both as an element of climate and as a natural resource. Two demonstration/experiments make evaporation and transpiration vivid for 7th graders. Graphing monthly water balance changes through the year, comparing mountain water balances with those of the plains and valleys, and other activities provide extensions into 9th grade and high school, or enrichment for faster students in 7th grade.

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Balancing Western Water

In junior high, both in science and social studies, it is normal to deal with water: moisture as an element in climate, the hydrologic cycle, water as a natural resource are all treated in geography texts.

Water is important everywhere, but especially so in the West. Most of the eastern half of North America has plenty of water most of the time. Most of the western half of Canada and the U.S. and most of northern Mexico suffer chronic shortages of water.

These classroom activities won't get you "over your head" in deep water. They will help your students toward a deeper understanding of water availability and use in the West.

We start with an introduction to the water or hydrologic cycle: "The Big Picture".Second we brainstorm the "usefulness of water" with an option of collecting news items about water and water projects. Meanwhile, we suggest carrying out a demonstration activity: "How much water does the grass drink?" However we suggest that the discussion of this first demonstration wait until after the second demonstration. The second demonstration: "What helps water evaporate faster?" is done with the help of one or two hair driers. After all this has been discussed, students will have a much clearer idea of the importance of evaporation and transpiration. This may be enough for average 7th graders.

Teachers with faster 7th graders or with 9th graders may wish to take them on into the month by month water balance, the comparison of a western station water balance with that of Washington, D.C. and/or the comparison of their local water balance with that of a mountain station nearby.

The Big Picture

Water is a flow resource, never being "used up" even though it all is used. It keeps coming in the water cycle. Most geography and earth science books will have a diagram showing evaporation from both lands and oceans, precipitation as rain and snow, evaporation of part of the precipitation and the rest running off through rivers finally to the sea. There may be many refinements and details. There are fine supplementary materials available to help make the water cycle vivid and meaningful to your students. A brief annotated list is attached.

In getting ready for the activities that follow you should be sure all students understand the broad outlines of the watercycle.

The Usefulness of Water

Any discussion on water needs to focus student attention on the use of water—why is water so important? Several strategies could be used to do this.

One of the most obvious is simply to list on the board or overhead all the uses students can think of for water. It is important to include not only everyday uses in the home, but also uses in agriculture and industry. After a fairly complete list has been gathered students might be assigned to bring in at least one additional use not mentioned.

Another approach might be to gather articles from magazines and newspapers that deal with some use of water. These articles will most likely include discussion of some issues surrounding water. This is another way to show water's importance. Dollar costs of projects will often be mentioned. Point these out to show importance. (Two Forks Dam on the Platte is budgeted for $370 million - where will this come from?)

Some combination of the two would be sufficient to raise the level of consciousness of students.

How To Make Evaporation Real

Everyone is aware of precipitation. Getting wet in the rain, trudging through the snow are vivid experiences that we connect with precipitation.

But in the water cycle evaporation is just as important as precipitation. For growing plants and soil, precipitation is the water supply, evaporation and transpiration (water given off from the plant's pores) are the demand. When the demand exceeds the supply, plants dry up, die, or go dormant. There's no food for animals. The ecosystem stops. For farms, when evaporation is greater than precipitation crops shrivel and die. We call it drought. But evaporation is invisible, silent, tasteless, without odor. About as close as we get to "experiencing" evaporation is when our mouths or nostrils sense the dryness of our western climate.

The question for us as teachers is how to make evaporation vivid and real. The following demonstration/experiments should help.

We suggest you start this first demonstration at the very beginning of your unit on water, preferably a week before you want to discuss it.

How Much Water Does the Grass Drink?

This demonstration/experiment compares the evaporation from two pans of grass and a pan of water. Over a week's time the amount of water evaporated and transpired by the well watered grass can be easily measured and the significance of that water is dramatic for the unwatered grass dies.

Objectives

After this activity students will be better able to define evapotranspiration, distinguish evaporation from transpiration, describe the role of soil in keeping water available to plants between rains.

Equipment needed

Three identical cake pans or refrigerator storage containers

Platform scale (an ordinary kitchen scale is ok)

Procedure

From the lawn, dig out two pieces of shallow sod to almost fill two of the cake pans. Water both well and pour off excess water so that they are exactly the same weight. Fill the third pan with water so it is the same weight also. (Soil is a little heavier than water so the 1st two pans can't be quite full).

Set all three pans on the window sill or on a table under the window. If possible keep the scales right there too. Make (or have one of your students make) a chart for the days of the week, the weight of the 3 pans, the amount of water added to pan #1 and the sky conditions something like the one below.

The first day as the demonstration is being set up all three pans will weight the same amount and no water will be added.

The following day weigh all three pans and record the weights. (We had small pans and they had lost about 2 oz. of water). Carefully pour enough water in pan #1 to bring it back to its original weight. Do not add water to pans #2 and #3.

Record the weight of water added. If your students are used to working in metric units by all means stay with metric units.

Repeat the procedure each day. Don't worry if you miss a day or two. The evaporation will continue. Three days may be too long to miss as the reserve of moisture in the soil may be used up.

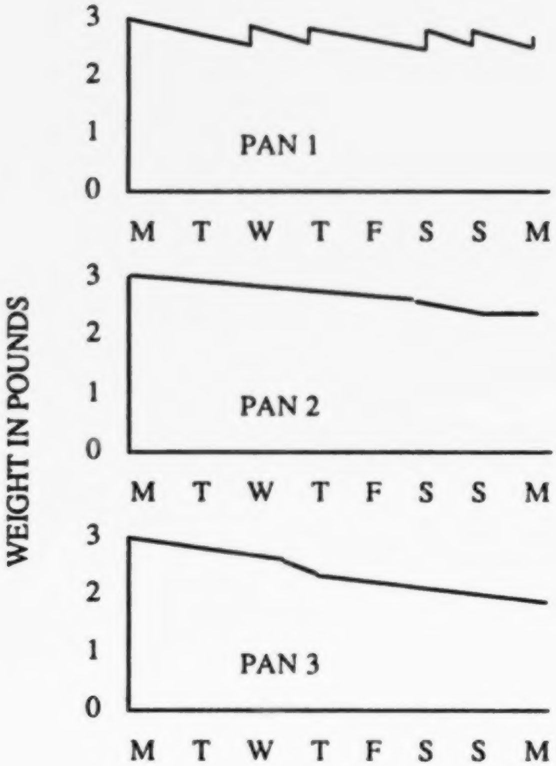
By the time a week is past the class will have a vivid example of evapotranspiration. One pan will be healthy bright green grass. The second will be dull shriveled grass maybe even turning brown. The third pan will still be open water but the water level will be observably lower.

We suggest that you delay the discussion of this experiment/demo until after you have introduced the hydrologic cycle and discussed the many uses of water, and until after you have done the demonstration "What makes the water evaporate faster?" At that time you may want to have the students graph the results of the, how much does the grass drink demonstration.

Our records looked like this

Weight (in lbs:oz)	Monday	Tues.	Wed.	Thurs	Fri.	Sat.	Sun.	Mon.
Pan #1	3:00		2:11	2:12		2:07	2:10	2:14
Water added	—		05	04		09	06	02
Wt. after addition	—		3:00	3:00		3:00	3:00	3:00
Pan #2	3:00		2:11	2:09		2:04	2:01	2:02
Pan #3	3:00		2:13	2:10		2:04	2:02	2:00

Our graph using small pans looked something like this:



Some of the discussion might include

Why did pan #1 drink more than #2 and #3? (Pan #3 had only evaporation, no transpiration and pan #2 ran out of water.)

How would the results have been different if the pans were much deeper so that they had twice as much soil?

(The soil in pan #2 would have stored more water so the grass could have stayed green longer.)

Would it be OK to think of the water added to pan #1 as precipitation? (Yes, the parallel is very close.)

Would it be OK to think of the soil as a storage reservoir storing water between rainstorms? (Yes)

What would happen if the precipitation was a lot more then the evapotranspiration? (It would soak down into the ground water system or run off into streams and lakes).

What do farmers call a long dry period when there is not enough precipitation to match the evapotranspiration? (A drought or a dry season.)

Is there anything they can do to save their crops? (If they are prepared, they can irrigate the way we sprinkle our lawns).

Was there any relationship between sunshine and evapotranspiration? (If the sun shown on the pans there would have been more evapotranspiration on sunny days then on cloudy days).

When the television weather person gives an ET amount, what does it stand for? (ET is an abbreviation for evapotranspiration. In this case the estimate for how much will take place during the watering period - often 3 days.)

In addition to sunlight does anyone know what else affects evapotranspiration? (Air temperature, wind, etc.)

Evaluation

Rather then have a quiz on the subject we suggest that you have the students write a one or two page description in their own words of the demonstration/experiment and of its significance).

What Helps Water Evaporate Faster?

This demonstration continues the process of making evaporation "real" and identifies the factors that increase or decrease the speed of evaporation. It is probably best done in groups. The students will time the evaporation from 4 different paper towels under different conditions.

Objectives

After this activity students will be better able to define evaporation, to list the environmental factors that increase the rate of evaporation.

Materials needed

4 paper towels
4 timing devices (stopwatches or calculator timers are ideal,but you could get by with one watch that has second hand on it.
one infrared heating lamp (or other lamp with reflector)
1/4 teaspoon measuring spoon
a cup or glass of water.
2 hair dryers (one will do)

Procedure

The four towels, one to each group, should be laid out on surfaces that won't be hurt by water far enough apart (3 or 4 ft) so that one group won't interfere with another. Students will time how long it takes for a small amount of water to evaporate when measured onto their towel. The same amount of water should be spread on each of the four towels. One fourth teaspoon is probably the best amount. In our trial we used 1/2 teaspoon and it took more than an hour for the unaided towel to dry. Group #1 will time the evaporation without any special assistance. Group #2 will time the evaporation with the infrared lamp shining on the towel. The lamp should be quite close, ideally about 6 inches. Group #3 will measure the time with a hair dryer blowing unheated air across the surface. Group #4 will use the dryer set for maximum heat.

In our trial we used 1/2 teaspoon of water and the times were

Group #1 72 minutes
#2 36 "
#3 5 "
#4 1 minute, 40 seconds.

(In practice you will probably have to start the discussion after group #3 have dried their towels and while #1 and #2 are still waiting. The bell may ring before #1 has more than an estimate.)

The discussion should bring out the conclusion that radiant energy (the heat lamp simulating the sun), wind, and higher air temperatures all increase the speed of evaporation.

A useful extension would be to time the same volume of water placed in a saucer or jar lid with no towel. This would take much longer even than #1 because so little surface is exposed to evaporation.

There are other extensions if the teacher is interested in illustrating the scientific method more fully. Would colored water evaporate more quickly that clear water? (Probably a little more quickly under the lamp, but probably not enough more quickly to measure with our instruments? On a muggy day, when the relative humidity is high, will the rates of evaporation be different? (Yes, the higher the relative humidity, the slower the evaporation, though the hair dryer will erase most of the difference.)

This might be a good time to define evaporation as well as to summarize the factors influencing it. The parallel of ice turning to water may be useful for those students who have never thought about a liquid turning into a gas.

We suggest that this is the best time to have the students graph the result of the "How much water does the grass drink?" activity and to go on with the discussion about the parallels with the real world.

Evaluation

A simple objective quiz on the factors affecting the rate of evaporation would be the easiest evaluation. Asking for a short essay on whether evaporation would be faster early on a quiet summer morning as compared to a windy summer afternoon and why would show more fully their comprehension.

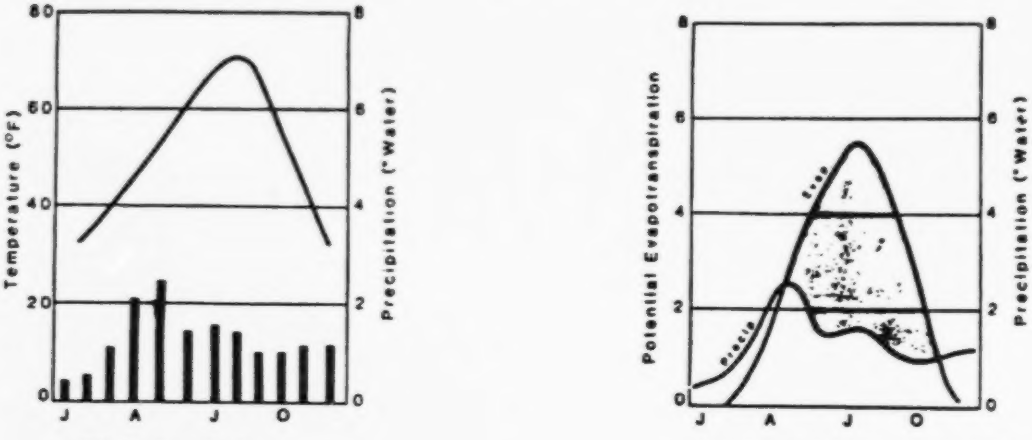
The Monthly Water Balance

The students, at least the better students, are now ready to deal with the month-by-month water balance. It will give them insight into the climate of their region in a way that ordinary climagraphs do not. You may wish to use this as an advanced activity for those seventh graders who need some extra work to keep them challenged.

Below, in Figure 2, we show a conventional climagraph and a water balance graph for Denver, Colorado. The climagraph shows monthly precipitation as a bar chart and monthly temperature averages as a line graph. It's advantage is its simplicity. We are all familiar with inches of rainfall and degree Fahrenheit (or centigrade). Most junior high texts will include climagraphs for selected climates.

From the point of view of the geography of water, the disadvantage of the climagaraph is that it shows the supply of, but not the demand for water. Temperature is only one of the elements affecting how much water a place needs.

DENVER, COLORADO



Climograph

Water Balance Graph

Figure 2.

Let's make sure we understand the terminology.

Precipitation: rainfall and snowfall measured in depth of water or water equivalent
Evaporation: process in which a substance, water in this case passes into the vapor state from the liquid or solid state
Transpiration: loss of water to the atmosphere from plants, mostly from the leaf pores
Evapotranspiration: the combined loss of water from both evaporation and transpiration
Potential Evapotranspiration: the estimated amount of evapotranspiration that would take place if there were always plenty of water available in the soil (and does take place when there is abundant precipitation or irrigation)

The water balance graph shows precipitation and potential evapotranspiration, both as line graphs. Thus we have a direct comparison of the supply of water and the demand for water. It is possible to identify the periods when there is plenty of precipitation and when there is not enough.

Interpreting Denver's water balance graph, we note that during January and February there is no evapotranspiration. Precipitation is less than one inch. In the Springtime precipitation increases fast enough to stay ahead of evapotranspiration until June when precipitation begins to drop and evapotranspiration continues to increase. Precipitation never catches up to evapotranspiration until November. The winter continues with low values for both. Many stations in the West have somewhat similar balances with a period of adequate precipitation in the spring giving way to serious deficiencies in the summer. The Mediterranean climate of much of California has adequate to generous precipitation all winter and a very dry summer.

We suggest that you have your students make a water balance graph for Washington, D.C. and a western station selected from the data in the appendix. You could select a nearby station or have different students graph different western stations.

Class discussion should bring out the differences. Washington has enough rainfall to meet its needs except for one or two months of the year. In many months there is water left over. Floods may be more of a problem than droughts. Most western stations will show long periods with inadequate precipitation. You may want to ask the students how we make up the deficiency in our region? Or do we live in a brown landscape most of the year?

A good homework assignment at this point would ask the students to find out where the water for their city, town, or farm comes from.

The Complimentarity of the High Country with the Valleys and Plains

An alternative title for this concluding discussion might be a paraphrase of the familiar psalm: "I will lift up mine eyes unto the hills, from whence cometh my water."

The water supply of most western farms, towns and cities comes directly or indirectly from the mountains. Boulder, Colorado owns its own string of lakes and the glacier that feeds them all summer. Many cities pipe water directly from mountain reservoirs. Most of the remainder take water from streams and rivers whose summer flow is augmented by mountain reservoirs. The remainder draw water from wells which tap underground flow from such rivers or from the mountains.

Thus the answers to "How do we make up the deficiencies?" and "Where does our water supply come from?" both lead us to the mountains. Review of why the mountains have a surplus gives us a chance to go back over the factors that speed up evaporation. In class discussion the following generalizations should develop clearly: Mountains get more precipitation than valleys and western plains. The physical principles are too complex for most 7th graders, but you can use the metaphor that the mountains comb the moisture out of the clouds.

Mountains have lower evapotranspiration because they have lower temperatures.

Since much of precipitation falls as snow, it is stored in the snow pack until May and June and even then it takes weeks for some of it to seep through the soil and rocks to the streams and rivers.

Thus the rivers coming out of the mountains have good flows of water when the deficiencies develop on the lower elevation farms and in the cities.

Reservoirs have been built to hold back some of the surplus until August and September when it is still needed for irrigation and water supply.

Extensions into Western Water History and Policy

The five generalizations sound simple. It was indeed fairly simple in the 1800's as farmers diverted water from the streams to their fields and built small reservoirs both in the mountains and in the farm country to hold water back for the latter part of the summer.

Soon all the easy projects were developed. The Federal Government was called upon to help build and finance larger more complicated projects. Who would get the additional water? Who would pay the costs? Who would get the electric power developed along the way? As the projects became more expensive, when should they stop? With wilderness becoming scarce, when should we leave some of the rivers wild? How do we divide limited water between upstream states and downstream states? Between cities and farms?

Junior high teachers may want to raise these questions, but the analysis and the answers probably wait for senior high and college. Indeed the questions never do get definitive answers. They continue to preoccupy the political process, the congress, the state legislatures, the federal and state courts.

There are many films, video tapes, slide sets, visiting speakers a teacher could use in these extensions. Only a very few are listed here with annotations

Film and Slide sets

Adventures of Junior Raindrop 8 min 1948
Animated cartoon of a raindrop's visit to earth. Raindrops can become delinquent and lawless when neglected. Live action scenes contrast poor and good watershed management. For grades 3-6. (Could be used in junior high.) Forest Service Films - free 16 mm film.

Lifeblood of the Land 18 min
The film shows how management of forests and grasslands affects the soil and production of water. Reclamation and protection of land is emphasized. Grades 7 - H.S. Forest Service Films - 16 mm film

Mountain Water 17 min 1950
In the western part of our country, people are dependent on the mountains for water. Shows how mountain vegetation conserves and regulates water supplies for industrial, agricultural, and domestic uses. Grades 7 - H.S. Forest Service Films 16 mm film

The River in the Desert 30 min 1980
The film focuses on past and present efforts to use the water of the Colorado River to make the desert lands of the Southwest "bloom." It examines the social, political and economic impacts of attempts to use and control the Colorado River. Grades 7 - H.S. Colorado Endowment for the Humanities 16 mm film

Wacky Western Water War: The Colorado Water Crisis 60 min 1978
A documentary tracing the history of Colorado's water use, water laws and policy. The program examines how water use priorities have been set, how such policies have shaped the growth of the state, and what the future may hold in this area. Grades 7 - H.S. Colorado Endowment for the Humanities 3/4" V tape

Water for the West 25 min 1957
Shows forest rangers and scientists working to increase the water yield in the Rocky Mountain country without damaging soil and other resources. Grades 8 - H.S. Forest Service Films 16 mm film

Watershed Wildfire 21 min 1958
The Santa Inez watershed on the Los Padres National Forest in California was damaged by wildfire which destroyed the protective vegetative cover in steep canyons. Immediate reseeding of such areas is important to help prevent floods. Graded 7 - H.S. Forest Service Films 16 mm film

Western Water slides 1987
This new set of slides and accompanying text presents a detailed look at the topic of western water. Topics covered are law, history, uses, western water projects and others dealing with water. Materials are drawn from many western states including Colorado, Arizona, California and Utah. The program includes 60 slides, glossary, learning activities, consumption figures by state and references. (All proceeds from the sale of the sets goes to NCGE).

Articles

Forrester, Frank H. "The World's Water", Weatherwise, April, 1985, p. 82.

A general overview of the world's water. Good background for teachers but could be used for students in 8th grade or up. Available in S.I.R.S. Science - 1985.

Goldin, Augusta. "What to do About Water", The Science Teacher, January, 1985, p. 34-37.

Discussion of water availability, especially freshwater. Includes information on general condition of water especially in the U.S. Includes ideas for debate on role of federal government in establishing a federal water policy. Suitable for grades 9 and up. Available in S.I.R.S. Science-1985.

Voropoyen, Grigori. "Water and Man", UNESCO Courier, January, 1985, p. 4-9.

An article suitable for use as a background article for teachers with more than a passing interest in water. Explanation of water cycle. Available in S.I.R.S. Science - 1985.

Government Documents

U.S. Department of Agriculture, Soil Conservation Service, "America's Soil and Water: Condition and Trends," 1981.

U.S. Department of Agriculture, Soil Conservation Service, "What is a Watershed?", 1985

Small pamphlet available through Soil Conservation Service Regional Offices.

Nace, Raymond L. "Water of the World". U.S. Department of the Interior, 1984.

Discussion of hydrologic cycle and distribution of world's water. Good basic facts on water. Good teacher resource.

Post, Austin and Meier, Mark. "Glaciers: A Water Resource", U.S. Department of the Interior, 1984.

Detailed explanation of importance of glaciers to availability of water in areas depending on mountain runoff for water. Includes water budget and explains part the glaciers play. Good for stater or areas with significant glaciers.

U.S. Department of the Interior. "Rain: A Water Resource" 1980.

Good general information dealing with water. Includes facts and figures referred to frequently such as acre feet, how much rain falls on an acre?, cubic mile of water, stream flow calculations, etc.

"Bismark, ND"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.52	0.52	1.04	1.96	2.44	3.60	2.88	2.48	1.48	1.20	0.64	0.52	19.28
PE	0.00	0.00	0.00	1.28	3.04	4.44	5.44	4.72	2.92	1.08	0.00	0.00	22.92

"Pierre, SD"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.48	0.48	0.96	1.88	2.52	2.73	2.48	2.12	1.16	1.04	0.32	0.48	16.88
PE	0.00	0.00	0.04	1.60	3.32	5.20	6.08	5.36	3.36	1.60	0.08	0.00	26.64

"Grand Island, NE"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.60	0.80	1.36	2.40	4.04	3.92	3.16	3.16	2.60	1.56	0.92	0.68	25.08
PE	0.00	0.00	0.36	1.72	3.60	5.28	6.56	5.56	3.36	1.84	0.40	0.00	28.92

"Wichita, KS"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.84	1.20	1.88	2.96	4.40	4.56	3.48	3.08	3.16	2.44	1.52	1.04	30.40
PE	0.00	0.00	0.60	2.12	3.68	5.88	6.88	6.32	4.12	2.20	0.60	0.00	32.32

"Oklahoma City, OK"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	1.36	1.24	2.12	3.40	5.28	4.04	2.80	2.76	3.02	2.88	1.92	1.52	32.40
PE	0.12	0.20	1.00	2.36	4.08	5.96	7.08	6.68	4.56	2.44	0.84	0.20	35.52

"Abilene, TX"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.92	1.00	1.16	2.60	4.20	2.68	2.08	2.00	2.48	2.72	1.24	1.28	24.36
PE	0.32	0.52	1.48	2.84	4.56	6.52	2.40	6.88	4.68	2.84	1.04	0.40	39.48

"Dallas, TX"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	2.36	2.28	2.84	4.24	5.04	3.32	1.84	2.28	2.60	3.04	2.72	2.60	35.16
PE	0.32	0.60	1.36	2.88	4.72	6.84	7.68	7.32	5.20	2.92	1.16	0.40	41.40

"Albuquerque, NM"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.36	0.36	0.40	0.60	0.68	0.60	1.44	1.32	0.92	0.84	0.44	0.44	8.40
PE	0.12	0.32	1.00	2.08	3.64	5.36	6.04	5.44	3.84	2.08	0.60	0.12	30.64

"Cumbres, CO"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	3.80	4.48	9.32	2.56	1.76	0.88	2.68	2.68	2.12	1.88	2.28	3.16	32.60
PE	0.00	0.00	0.00	0.00	1.72	3.20	3.91	3.60	2.44	0.88	0.00	0.00	15.76

"Phoenix, AZ"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.84	0.76	0.68	0.40	0.12	0.08	1.00	1.08	0.76	0.48	0.60	0.84	7.64
PE	0.52	0.84	1.60	3.00	5.16	7.56	8.44	7.72	6.32	3.36	1.24	0.52	46.28

"Flagstaff, AZ"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	1.96	1.92	1.84	1.18	0.68	0.56	2.84	2.96	1.76	1.52	1.28	1.68	20.28
PE	0.00	0.00	0.48	1.44	2.60	3.76	4.64	4.16	2.96	1.64	0.52	0.00	22.20

"Ft. Collins, CO"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.44	0.60	1.04	2.08	2.88	1.64	1.80	1.32	1.28	1.16	1.28	0.48	15.24
PE	0.00	0.00	0.32	1.52	2.96	4.28	5.08	4.68	3.08	1.56	0.32	0.00	23.80

"Longs Peak, CO"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.72	1.16	2.08	2.76	2.40	1.68	3.64	2.28	1.76	1.68	0.88	0.92	21.96
PE	0.00	0.00	0.00	0.28	2.00	3.32	3.96	3.64	2.52	1.28	0.00	0.00	17.00

"Salt Lake City, UT"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
	1.36	1.36	1.88	1.96	1.80	0.88	0.56	0.88	0.84	1.44	1.40	1.36	15.72
	0.00	0.00	0.60	1.60	3.16	4.84	6.40	5.72	3.60	1.84	0.48	0.00	28.24

"Park City, Ut"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	2.88	2.80	3.04	1.84	1.20	0.68	1.20	1.44	1.24	1.32	1.64	2.36	21.60
PE	0.00	0.00	0.00	1.04	2.60	3.92	4.84	4.24	2.84	1.44	0.08	0.00	21.00

"Reno, NV"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	1.40	1.12	0.80	0.48	0.60	0.36	0.28	0.24	0.28	0.44	0.64	1.08	7.72
PE	0.00	0.28	0.88	1.60	2.84	4.04	5.20	4.68	3.12	1.72	0.68	0.08	25.12

"Yosemite, CA"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	6.44	5.72	5.64	2.72	1.52	0.72	0.20	0.36	1.04	1.96	2.84	4.52	33.56
PE	0.12	0.52	1.12	1.92	2.84	4.00	5.12	4.60	3.20	2.00	0.76	0.16	26.36

"Sacramento, CA"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	3.68	3.08	2.64	1.52	0.72	0.12	0.00	0.00	0.36	0.80	1.84	3.68	18.32
PE	0.60	0.92	1.60	2.40	3.40	4.60	5.60	5.08	3.96	2.64	1.20	0.60	32.60

"Mt. Shasta, CA"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	6.52	5.60	4.64	2.68	1.88	0.92	0.20	0.24	0.92	2.36	4.12	5.80	35.88
PE	0.00	0.40	1.00	1.72	2.72	3.96	4.88	4.44	3.24	2.96	0.80	0.20	25.12

"Klamath Falls, OR"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	2.04	1.48	1.20	0.84	0.88	0.76	0.28	0.24	0.56	1.00	1.84	1.84	12.96
PE	0.00	0.08	0.76	1.64	2.88	3.88	5.08	5.76	2.96	1.68	0.56	0.00	24.08

"Crater Lake, OR"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	7.88	7.32	5.76	4.92	2.20	2.08	0.72	0.64	3.24	3.80	7.44	8.76	54.76
PE	0.00	0.00	0.00	0.40	1.88	3.28	4.16	3.80	2.20	1.32	0.20	0.00	17.24

"Boise, ID"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	1.48	1.40	1.36	1.20	1.32	1.38	0.24	0.20	0.48	1.04	1.32	1.36	12.32
PE	0.00	0.20	0.84	1.88	3.20	4.48	6.08	5.32	3.24	1.84	0.48	0.00	27.56

"New Meadows, ID"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	3.08	2.40	2.00	1.64	1.64	1.60	0.64	0.68	1.16	1.72	2.80	2.80	22.16
PE	0.00	0.00	0.08	1.52	2.96	3.72	4.72	4.16	1.36	1.40	0.08	0.00	21.00

"Billings, MT"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.56	0.64	1.04	1.36	2.00	2.68	0.96	0.84	1.24	1.08	0.68	0.60	13.68
PE	0.00	0.00	0.12	1.48	3.24	4.36	6.00	5.28	3.24	1.68	0.20	0.00	25.60

"Yellowstone Park, WY"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	1.60	1.32	1.72	1.36	2.00	1.68	1.32	1.20	1.24	1.44	1.40	1.44	17.72
PE	0.00	0.00	0.00	0.92	2.40	3.56	4.68	4.16	2.52	1.16	0.00	0.00	19.40

"Yakima, WA"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	1.12	0.80	0.48	0.44	0.56	0.64	0.20	0.20	0.44	0.56	1.00	1.08	7.52
PE	0.00	0.20	0.96	2.04	3.60	4.76	5.92	5.12	3.28	1.68	0.36	0.00	27.92

"Anatone, WA"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	3.44	2.16	2.04	2.08	1.84	2.32	0.60	0.92	1.36	1.84	2.76	2.72	24.08
PE	0.00	0.00	0.44	1.44	2.64	3.88	4.96	4.44	2.80	1.56	0.48	0.00	22.64

"Spokane, WA"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	2.12	1.64	1.32	1.08	1.36	1.32	0.52	0.60	0.88	1.32	2.04	2.20	16.40
PE	0.00	0.00	0.00	1.76	3.32	4.32	5.64	5.00	3.04	1.56	0.36	0.00	25.00

"Fernie, BC"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	5.28	3.80	3.48	2.36	2.60	2.80	1.68	1.52	2.44	3.72	4.24	5.60	39.52
PE	0.00	0.00	0.00	1.44	2.92	4.04	5.04	4.24	2.40	1.16	0.00	0.00	21.24

"Lethbridge, Alberta"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	0.60	0.68	0.96	1.24	1.88	2.72	1.64	1.52	1.58	1.04	0.80	0.76	15.36
PE	0.00	0.00	0.00	1.44	3.04	4.29	5.08	4.36	2.68	1.36	0.00	0.00	22.24

"Lake Louise, Alberta"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	2.56	1.84	2.04	1.24	1.56	2.52	1.68	1.76	1.84	1.84	2.16	3.24	24.28
PE	0.00	0.00	0.00	0.00	2.44	3.60	4.36	3.76	2.08	0.56	0.00	0.00	16.80

"Washington, DC"

	J	F	M	A	M	J	J	A	S	O	N	D	Y
P	3.30	3.20	3.70	3.30	3.50	4.20	4.50	4.30	3.50	2.90	2.40	3.20	42.00
PE	0.00	0.10	0.70	1.90	3.80	5.20	6.10	5.30	3.80	2.00	0.80	0.10	29.80

A COMPARISON OF TWO ISLAND NATIONS USING GOODE'S WORLD ATLAS

JUNIOR HIGH

Japan and the United Kingdom are strikingly similar in that they are both fairly small island nations of approximately the same latitude. Do these similarities in physical geography lead to similarities in other areas, such as culture and economy? Students will investigate this question by first hypothesizing further similarities between the two nations and then by testing these hypotheses using the thematic maps and the gazeteer in Goode's World Atlas.

Martha Dick
Boltz Junior High
Fort Collins, Colorado

Materials Needed

chalkboard for brainstorming similarities
Goode's World Atlas or comparable thematic atlas (enough for each group of 2 or 3 students to have one atlas)
a large wall map of the world
overhead transparency of Student Handout #1

Time Needed 1-2 periods

Procedure

1. Point out Japan and the United Kingdom on the world map. Ask students to state the obvious similarities between the two countries. Answers should include

> both island nations
> both fairly small
> similar latitudes

Point out that these similarities are all related to physical geography.

2. Ask students to guess or hypothesize other similarities between Japan and the U.K., keeping the physical similarities in mind. Guesses might include:

> both fishing nations
> may have limited farm land
> not enough food
> may have histories of talking other lands

3. Tell students that they will investigate some of these hypotheses and others by using the gazeteer (information table) and the thematic maps (maps giving information about certain themes, such as population and life expectancy) in Goode's World Atlas.

4. Hand out a Comparison Chart (Student Handout #1) and an atlas to each group of 2 or 3 students. Have them complete the charts.

5. As students finish, have them fill in the answers on the overhead transparency for use in discussion later.

6. Use Student Handout #2 as a worksheet or as discussion questions, or both.

7. In closing, remind students that the thematic atlas is an excellent source to use for certain kinds of information about countries.

A COMPARISON OF TWO ISLAND NATIONS USING GOODE'S WORLD ATLAS

Teacher Information

Area of Comparison	Page #*	United Kingdom	Japan
1. Location (latitude)	3	50-58 N Lat.	32-45 N Lat.
2. Area in Sq. Miles	243 & 245	94,092	145,834
3. Total Population	243 & 245	56,040,000	120,200,000
4. Population Density	20-21	>250 per sq. mile	>250 per sq. mile
5. Birth rate	22	<16 (very low) (per 1000 pop.)	<16 (very low)
6. Death Rate	22	10-15 (low)	<10 (very low)
7. Urbanization	23	>60%	>60%
8. Per Capita GNP	24	>6400 $U.S.	>6400 $U.S.
9. Literacy Rated	24	>90%	>90%
10. Languages	25	Germanic (mostly) and Celtic	Japanese
11. Religious	25	Protestantism	Japanese (Shintoism and Buddhism superimposed.)
12. Calorie Supply	26	>120% (well above requirements)	110-120% (above requirements)
13. Life Expectancy	27	>70 years	>70 years
14. Predominant Economies	28-29	agriculture manufacturing commerce mining	agriculture manufacturing commerce mining forest products
15. Fisheries	36	important area	important area

*Source: Goode's World Atlas, 17th edition
Page numbers listed are the same in the 16th Edition with the following exceptions:
Area—pages 239 and 241
Total population—pages 239 and 241

A COMPARISON OF TWO ISLAND NATIONS USING GOODE'S WORLD ATLAS

JUNIOR HIGH

Student Handout #1

Comparison Chart

NAMES________________________

____

____

Directions—Use the Goode's World Atlas and the page numbers indicated to find the following information for Japan and the United Kingdom (not including possessions).

Area of Comparison	Page #	United Kingdom (not including possessions)
1. Location (Latitude)	3	
2. Area in Sq. Miles	243&245	
3. Total Population	243&245	
4. Population Density	20-21	
5. Birth Rate (per 1000 pop.)	22	
6. Death Rate (per 1000 pop.)	22	
7. Urbanization	23	
8. Per Capita GNP	24	
9. Literacy Rate	24	
10. Languages	25	
11. Religions	25	
12. Calorie Supply	26	
13. Life Expectancy	27	
14. Predominant Economies	28-29	
15. Fisheries	36	

JUNIOR HIGH

A COMPARISON OF TWO ISLAND NATIONS USING GOODE'S WORLD ATLAS

NAME________________________DATE ______________ PER _____

Student Handout #2: Questions Using Research Data

1. List the areas of similarity between Japan and the United Kingdom.

a. ______________________
b. ______________________
c. ______________________
d. ______________________
e. ______________________
f. ______________________
g. ______________________
h. ______________________

2. Which of these would seem to relate to the fact that both are fairly small island nations of approximately the same latitude?

a. ______________________
b. ______________________
c. ______________________
d. ______________________

3. What are the big differences between the two countries according to the comparison chart?

a. ______________________
b. ______________________
c. ______________________

4. What might account for these differences?

5. Which of our hypotheses did we disprove?

6. For which of our hypotheses did we not find information in the atlas?

7. Where would we need to look for this information?

8. What conclusions can you make about our original question: Do the physical similarities between Japan and the United Kingdom lead to similarities in other areas, such as culture and economy? Explain.

DISASTER ON THE RHINE

JUNIOR HIGH

To help students understand the importance of the Rhine River in Western Europe, the impact of man on the natural environment, and how an incident in one country can affect other countries along the Rhine.

Martha Dick
Poudre R-1 Schools
Fort Collins, Colorado

Sandra E. Hargrove
Blevins Junior High School
Fort Collins, Colorado

Time needed 1 - 2 class periods

Materials needed

Overhead of map of the Rhine River countries
Copies of student worksheet
News Bulletin (1 copy for teacher use)
Signs for each of the following countries:
    Netherlands
    West Germany
    France
    Switzerland
    Great Britain
    Austria and Liechtenstein (optional signs for larger classes)

Optional Material

Background information from an article in The Denver Post by Jane Elsner "Rhine pumps toxic blood to Europe's heartland" Thursday, December 4, 1986.

Procedure

1. Have the students complete the worksheet on the Rhine River.
2. Discuss the simulation with the students and divide them into five groups, each representing a country.
3. Give the students time (10-15 minutes) to discuss and make decisions.
4. Ask a representative from each group to make its report to the Rhine Commission (entire class) for discussion.
5. Let the class decide by vote (one per country):
    a. Who is at fault
    b. Who should pay the damages
6. Discuss question 3 - "What should be done to prevent further disasters?"

Overview of Simulation

You are about to participate in a simulation concerning a disaster that could take place on any river. As members of a commission organized to deal with the problem, you will become familiar with how man can affect his environment (in this case a river). You will realize too how such an incident can affect other countries that depend on the same natural resources.

First you need to complete a worksheet on the Rhine River to become familiar with the area. Then you will become a member of the Rhine River Commission and represent one of the nations involved. It will be your responsibility to represent your country's interests while making decisions to solve the problem.

DISASTER ON THE RHINE

The Disaster

On November 1, officials of the city of Ludwigshafen, West Germany announced a 30 ton spill of toxic chemicals into the Rhine. A breakdown in the cooling system of the BASF AG Chemical Plant warehouse was cited as the cause of the spill. Millions of fish were killed and the drinking water supply of countries along its course are threatened. Officials could not immediately say how many water works would be affected, but said there would be at least several dozen.

No illness related to the spill has so far been reported. However, they have discovered that a toxic herbicide, dichloracetic acid, is in the Rhine in concentrations up to a thousand times the level considered safe for drinking water.

Orders have been issued in West Germany to close all waterworks plants that are less from 500 yards from the river.

Possible Affects of this disaster include:

1. 90% of the fish downstream could die
2. Great Britain fears that the Dogger Banks (fishing banks) might be affected by the poison
3. The Netherlands blames the spill for the deaths of many of its dairy cattle and demands $100,000 payment
4. Germany claims that there is as much river pollution from the French coal industries along the Moselle as from this chemical spill
5. There will be a shortage of fresh drinking water

Decisions to be made:

1. Who is at fault?
2. Who will pay the damages?
3. What should be done to prevent this from happening again? (recommendations)
6. Newsflash - Read the news bulletin and discuss.

NEWS BULLETIN ! !

Today word has just come in that a second disaster has occurred on the Rhine River. The Sandoz Company warehouse in Basil, Switzerland, is the scene of yet another chemical spill.

How will this affect the commission's decision?

Debriefing

1. Who is responsible for disasters along a river?
2. What countries tend to be most vulnerable to criticism along the Rhine?
3. How does man affect a river system?
4. How does a river affect people?
5. France wants to build a new chemical plant on a river that is a tributary to the Rhine River. Should other nations be concerned?

Rhine River Student Worksheet

1. List the countries along the Rhine.

____
____
____
____
____

2. Which direction does the river flow?

____

3. What is the length of the Rhine (shown on the map)?

____

4. What sea does the Rhine flow into?

____

5. What country is across this sea from the mouth of the river?

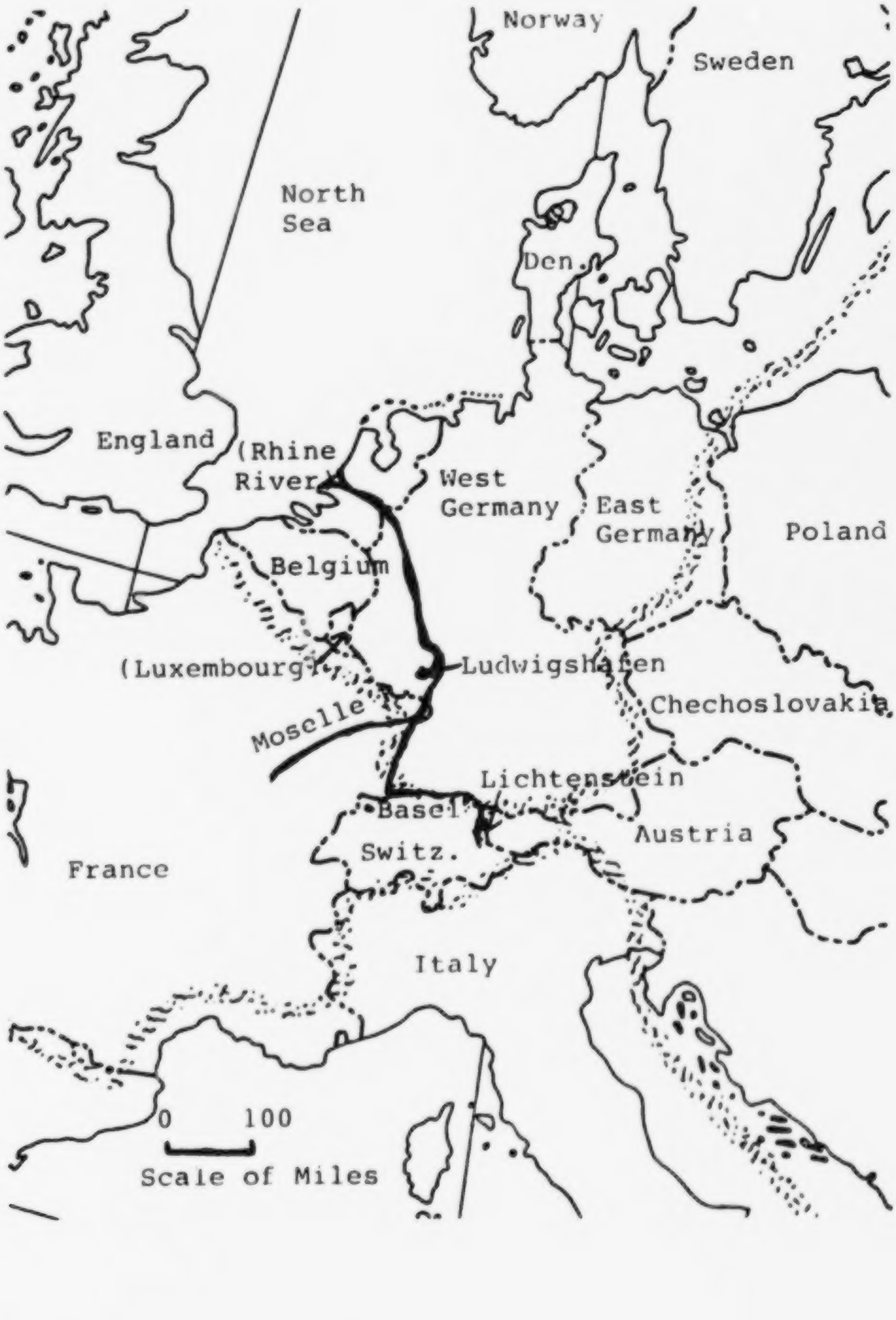
____

6. List 3 things the river could be used for.

____
____
____

7. Which country does it seem would get the greatest use out of the Rhine River?

____


Norway
Sweden
North Sea
Den.
England
(Rhine River)
West Germany
East Germany
Poland
Belgium
(Luxembourg)
Ludwigshafen
Chechoslovakia
Moselle
Lichtenstein
Basel
Switz.
Austria
France
Italy
0 100
Scale of Miles

THE BRAZIL INVESTMENT GAME

JUNIOR HIGH

This game is designed to help students recognize some of the major products of Brazil, identify regions that produce those products, and become aware of the factors (local and international) which affect Brazil's economy.

Students play the game in groups of four or less per game board. Each student rolls a die to move his marker around the board. As they move, students decide whether or not to invest in a particular product. Their investment is in terms of points from a starting capital fund of 10 points.

Sandra E. Hargrove
Blevins Junior High
Fort Collins, Colorado

Teacher Instruction Guide

Materials Needed

1. One game board for every four students in the class. Prior to passing out the game board, each region on the central map and its products on the spaces should be color-coded as follows to coordinate with the fate cards. Warning: use light colored markers or colored pencils to color the game board in order to avoid covering up the labels.

a. South Region = Red (products: black beans, coal, and soy beans)
b. Southeast Region = Yellow (Products: coffee, iron ore, transportation industries)
c. Northeast Region = Orange (Products: cotton, sugar cane, cacao)
d. Central-west Region = Green (Products: rice, manioc, livestock)
e. North Region = Blue (Products: forest products, rubber, bauxite)

2. One score sheet should be xeroxed for each student.
3. One student guide should be run for each student.
4. Fate cards consisting of 5 regions should be run for each game board of four students. This must be run on colored paper (one color per region) or else xeroxed and pasted to colored construction paper. Once duplicated, cut each page of the cards up along the dark lines indicated. Fate are to be placed face down in 5 stacks (by color) beside the game board.
5. One marker for each student to use in moving around the game board. Almost anything could be used, but I would suggest using four different markers per game board. One realistic set of markers could be collected that represented Brazil's products such as: a black bean, a coffee bean, small rock representing an "ore", a soy bean, a small packet of sugar, a cotton ball, etc.

Estimated Time 1-2 days including debriefing

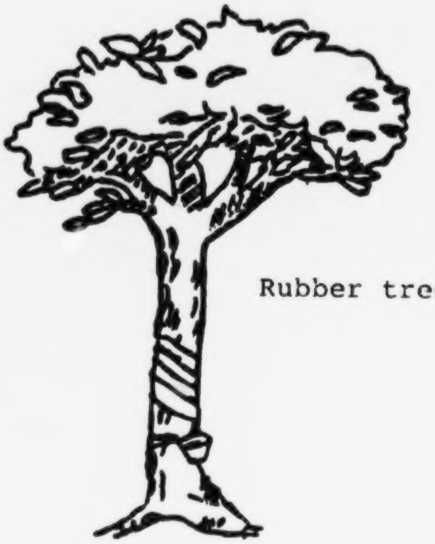
Miscellaneous Information on Brazil's Products

1. Black beans: The national dish of Brazil is *Feijoada*, a hearty dish of black beans cooked with sausage, beef, and bacon.

2. Cocoa: An evergreen tropical American tree, having yellowish flowers and reddish-brown seed pods. It is also called the "chocolate tree" since the seed of this tree is used to make chocolate, cocoa, and cocoa butter. The name is from Nahuatl Indian dialect—cacahuatl or cacao beans.

3. Bauxite: Often called "red gold", it comes from a sort of hard red soil called laterite. A hot, baking sun and heavy rainfall leach the soil of many minerals. Large amounts of aluminum oxide are left. This ore is mined with huge power shovels in large open pits. When bauxite is turned into aluminum, it has many uses. This is because aluminum is strong, light-weight, and a good conductor of electricity.

4. Rubber: This is a light cream to dark amber elastic, amorphous, solid polymer that is generally prepared by the coagulation and drying of the milky sap, or latex, of various tropical plants, especially the rubber tree. (See below.)



Rubber tree

5. Manioc: A starch derived from the root of the cassava plant. We use manioc in the United States in the form of tapioca. In tropics the starch is used as a staple food product much as a potato is used. When bread is made from it the bread is known as cassava bread.

THE BRAZIL INVESTMENT GAME

Student Instruction Guide

Overview

You are about to play a game that concerns the economy of Brazil. The class will be divided into groups of four investors. Each group will be given a score board, markers, fate cards, score sheets, and a die. Each investor will begin the game with the same amount of capital points. "Capital" is a word that means "money to invest".

The goal of each player is to make good investments in the products of Brazil in an effort to make more money (Brazilian Cruzeiros) than the other investors at the same game board. As you play this game, you will become more familiar with some of the important products of Brazil and the regions which produce them. You will also become aware of some of the factors (fate cards) which affect Brazil's economic failures and successes.

Procedure

1. Enter you name on the score sheet.

2. The 10 points is your starting capital. Each point represents 10,000 Cruzeiros of Brazilian money.

3. Select a marker and place it on one corner of the game board.

4. Roll the die to see who goes first. The highest number begins the game. The game will continue around the board to the right of the starting player. This is the same direction you will move your marker.

5. The first player rolls the die and moves his/her marker the dame number of spaces shown on the die. Do not count the corner boxes as spaces, these are just home bases.

6. Once you have moved your marker, enter the product in the score sheet for that turn. Decide whether or not you would like to invest points (see the cost guide below) in that product and enter the amount on the score sheet. This is a cost and should be entered as a minus number. If you decide not to invest, enter 0 on the score sheet and your turn ends. If you do invest, draw a fate card from the region which produces the product (same color as the space on the game board). Enter the result on your score sheet and total up your new balance.

7. Write your balance amount in the "capital" column for your next turn.

8. If you land on the "CHOICE" space, you may invest in any of the products shown on the game board. Draw a fate card from the colored stack that produces that product.

9. Each player repeats the above steps until the game is ended by the teacher. Investors with the most points win the game in each group.

Investment Cost Guide

Product	Cost
Black beans	2
Coal	7
Soy beans	4
Coffee	5
Iron Ore	8
Transportation Industries	9
Cotton	6
Sugar Cane	5
Cocoa	3
Forest Products	10
Rubber	3
Bauxite	8
Rice	4
Manioc	1
Livestock	6

Debriefing

1. Analyze your score sheet to see which products yielded the greatest profit.
2. What kinds of events affected Brazil's economy?
3. Which regions seemed to yield the greatest profits? Why do you think this is so?
4. Compare Brazil's economy to the economy of the United States. How are they alike? How are they different?
5. What geographical features will affect the future of Brazil's economic development? OR You have been hired by a wealthy group of United States investors (or perhaps by U.S.

bankers) to make recommendations concerning Brazil's economy. Include in your written report to them, a list of the products you consider are the most profitable in each region. Also, make recommendations concerning the overall investment prospects or dangers they should be aware of in Brazil's economic future.

THE BRAZIL INVESTMENT GAME

SCORE SHEET

Investor: ______________________________

TURN	CAPITAL	PRODUCT	COST (-)	PROFIT (+)	FATE BALANCE
Practice	10 Points				
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Fate Cards for the South (Red)

Good lava soils in this area are excellent for raising crops such as coffee and the national favorite dish made with black beans.

Bean & Coffee profit +10
Other = cost

Although coffee growing began in the Southeast, the South now produce's more than half of Brazil's coffee. Most of this coffee is exported to the United States.

Coffee Profit +20
Other = cost

This region shares Brazil's densest road network with the Southeast. As a result, it is easy to get products to markets

Profit +15

Moderate climate makes it easier to work year round in this region.

Profit +6

Coffee production in other Latin American countries, such as Columbia, has caused the demand for coffee to drop.

Profit +5

Although large deposits of coal are mined in this region, it is of poor quality.

Profit +3

Since this region was colonized by a variety of Europeans, it has developed that is different from the rest of the country. Such a cultural difference may result in some trade difficulties.

Profit +4

Much of the region is still a "frontier" area in many respects. Lack of development raises costs.

Profit +2

Fate Cards for the Southeast (Yellow)

Japanese immigrants to Brazil make up the largest Japanese community outside of Japan. Their presence has introduced a new cash crop—soybeans are used for livestock feed and processed foods.

Profit +8

Brazil's largest hydroelectric plants exist in this region. They provide needed energy for the many industries here.

Profit +20

The best roads and railroads in Brazil run between Sao Paulo and Rio de Janeiro. Goods are shipped to market in great abundance.

Profit +15

Brazil has one fourth of the world's supply iron. Iron is essential in making the steel required by industries.

Profit +16

The government shipped the capital from Sao Paulo to Brasilia in the Central-West region. In spite of this, Sao Paulo still acts as the financial capital of Brazil.

Profit +10

Oil is needed to produce the goods of this region. Unfortunately, Brazil has so little oil, that it must import 80% of the oil it needs. Paying for this oil is a drain on the economy.

Profit +4

Brazil has begun manufacturing jet fighters for export. The problem with this is that the United States objects to Brazil's choice of customers in the Middle East. Investments are discouraged.

Profit +5

Slums (*favelas*) reveal the gap between rich and poor in the cities of this region. Miserable conditions contributes to social unrest and violence.

Profit +3

Fate Cards for the Northeast (Orange)

Sugar cane was Brazil's first major industry. It continues to be an important export product.

Sugar Profit +10
Others = cost

A by-product of the sugar industry is ethyl-alcohol. Since Brazil has very little petroleum, alcohol has been substituted in nearly 50% of Brazil's automobiles.

Sugar Profit +15
Other Profit +5

Brazil is one of the world's largest producers of long fiber cotton.

Profit +16
Others = cost

A new airport with an international runway has been built in this region at Juazeiro. This will encourage more people to invest in this region's products.

Profit = cost +10

Most of the cacao (cocoa) beans produced in Brazil are exported to the United States. Unfortunately, diet-conscious citizens of the U.S. have cut back on eating chocolate!

Profit +1

A severe drought has ruined agricultural crops and has impoverished thousands of people. Investments are lost.

Profit =0

West Indies farmers have increased production of sugar at lower prices than Brazilian sugar. Investments in sugar are not as high as expected

Profit +3

It has been recently revealed that funds provided by foreign investors to support a series of public works projects have been disappearing into the wrong hands. Many now distrust any investments in this region.

Profit +4

Fate Cards for the North (Blue)

Investors in Forest Products know that one product is the valued carnauba wax. This wax is used in making phonograph records, dynamite, and electric insulation. It is exported to the United States in large quantities.

Profit +20

Investors in Forest Products recognize that many valuable hardwoods come from the Amazon rainforest. Woods such as ebony, mahogany, rosewood, and Spanish cedar are used in making furniture.

Profit +25

New discoveries of bauxite have been announced in this region. Bauxite is used to make aluminum—a major metal used in today's society.

Profit + 10

Wild rubber trees were first "tapped" in Brazil. At one time, Brazil had a monopoly on the world's rubber market. Ford Motor Company is known to have opened new rubber plantations in the region.

Profit +9

Clearing the Amazon rainforest in order to extract its forest products is condemned worldwide for its results. Many Indians have been pushed off their lands and have perished. Climatologists predict drastic changes in the world's climate if the forest disappears.

Profit +5

Rubber tree seeds smuggled out of Brazil in 1876 were planted in Malaysia. Malaysian rubber plantations today not only outproduce Brazilian wild rubber trees, but also produce rubber more inexpensively.

Profit +1

Working conditions are intolerable in the heat and humidity of this region. Few people can be persuaded to work in this area.

Profit +3

The lack of adequate transportation facilities (roads, railroads, or air-freight) in this region create many difficulties in getting products to market.

Profit +2

Fate Cards for the Central West (Green)

The opening of the new city of Brasilia as the capital of Brazil has stimulated growth and the movement of people into this region.

Profits +7

The Itaipu Dam on the Parana River is the world's largest dam. It is just beginning to realize its potential for producing hydroelectric power. Investors are encouraged.

Profits +7

Research into the savannas of this region indicate that this area could become a great agricultural powerhouse for Brazil. This however could mean that lands normally used by cattle would become limited.

Profits for crops +10

Profits for livestock +7

New highways are being built to connect the capital of Brazil (Brasilia) with coastal cities. These same highways will help speed transportation of goods to markets.

Profits +8

The long, dry winter season typical of this region was longer than usual. Crops and livestock were set back causing financial losses.

Profits +3

Brazil is the world's greatest producer of manioc. However, most of it is consumed by Brazilians as a major food staple. Since most Brazilians who eat it are poor, there is little profit.

Profits +2

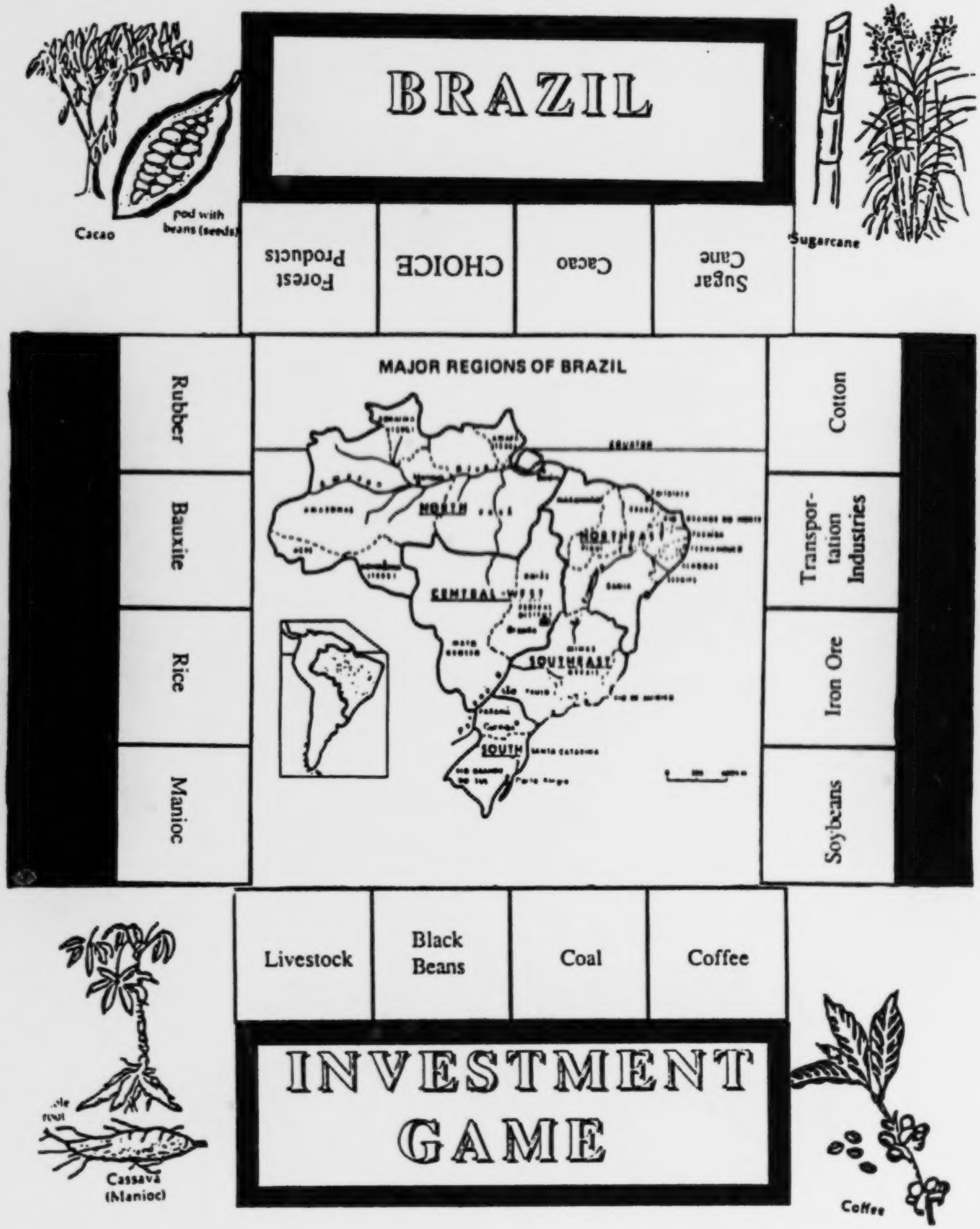
The soil of this region is highly acidic. As a result, the region has traditionally been believed to be fit only for grazing cattle rather than for agriculture.

Profits for crops +1

Profits for cattle +10

Few people live in this largely undeveloped area. Therefore, it is hard to find workers and markets must be found elsewhere.

Profits +4


BRAZIL
Cacao
pod with beans (seeds)
Sugarcane
Forest Products
CHOICE
Cacao
Sugar Cane
Rubber
Bauxite
Rice
Manioc
MAJOR REGIONS OF BRAZIL
NORTH
NORTHEAST
CENTRAL-WEST
SOUTHEAST
SOUTH
Cotton
Transportation Industries
Iron Ore
Soybeans
Livestock
Black Beans
Coal
Coffee
INVESTMENT GAME
Cassava (Manioc)
Coffee

REGIONAL PLANNING IN BRAZIL: A SIMULATION IN DECISION - MAKING

JUNIORHIGH

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As a "developing" nation, what policies should Brazil follow to have more control over its environment and thereby maximize its ability to provide the best possible life for its citizens? This is the question all nations really face. To analyze this question, students will participate in a simulation in which the class will be divided into six groups. Five groups will represent five economic regions of Brazil while a sixth group will represent the interests of the national government.

Groups will receive packets of information outlining their region's background and current situation. Each group must use the information to fill in an analysis sheet and make a plan to propose to the government. Groups will present their plans in front of the class to the government agency. The government agency will discuss the plans and determine which they will support. A final decision will be delivered to the class with reasons for the decision presented.

Objectives

1. Students will be able to identify on a map the locations of five major regions in Brazil.
2. Students will understand that regions are basic units of geographic study.
3. Students will examine how human changes to natural settings are based on cultural appraisals and occupance.
4. Students will discuss the diversity of resources and needs that a nation must consider as it makes plans for economic development.

Estimated Time 2 - 3 Class periods

Materials Needed

Student Guide
Packet of materials for each group
Nametags for each group such as "Northeast" to identify each region during group presentations.
Overhead transparency of the Regional Map of Brazil
Teacher's Guide

Procedure

Day 1.—Step 1: Establish set by asking the students to define or describe what a region is. Follow up by labeling the regions in the U.S. states. Compare the regions to the five regions of Brazil (See the Teacher's Guide).
Step 2: Divide the class into six groups. Distribute the Student Guide and read it over with the class.
Step 3: Groups read over the information in their packets, discuss the resources and problems of their region, and develop a plan as outlined in the worksheet.

Day 2.—Step 4: Continue group work if necessary. Or begin group reports. Arrange the classroom so that groups sit together in front of the government agency which listens to the proposals.
Step 5: Government agency group confers and makes a decision about the plans. They report their decision and justification to the groups.

Day 3.—Step 6: Debrief the class by discussing the realities of regional development in Brazil (See Teacher Guide).
Step 7: Evaluate student learning in this simulation by giving a resource-based test on regional development in another part of Latin America.

Teacher Guide

Brazil possesses many attributes that are characteristic of the United States in the last century. Consequently, it is conceivable that Brazil has the opportunity to grow into a world power in the next century. In the years since World War II Brazil has shown rapid economic development. Whether this growth can be maintained or even controlled is anybody's guess.

The rapid economic growth of Brazil since World War II has not been reflected equally in each of its five regions. In fact, Brazil has been described as one of the best examples of regional inequality in the world. There are inequalities in terms of natural resources, transportation facilities, population distribution, standard of living, political influence, industrialization, and general social-economic development. These inequalities exist not only between regions but within regions as well. Much of the unequal development exists because of past government plans that concentrated financial support in the urban areas of the South-East Region. This was only to be expected since that had been the traditional seat of political and economic power.

With the election of the PMDP (Brazilian Democratic Movement) in January, 1985, there is the promise of a new approach to developing Brazil. The new government is very much concerned about developing all areas of Brazil and is seeking to find regional projects that would benefit the nation as a whole. The new approach is that the plans should not come from the government and impose on the regions, but rather should be proposed by the regions and supported by the government. This is more of a "grass roots"—give the people what they think they need—approach.

Brazilians have hopes that their country will eventually become a "spokesperson" for other developing nations who will see Brazil as a model of how to plan development.

Brazil's flag

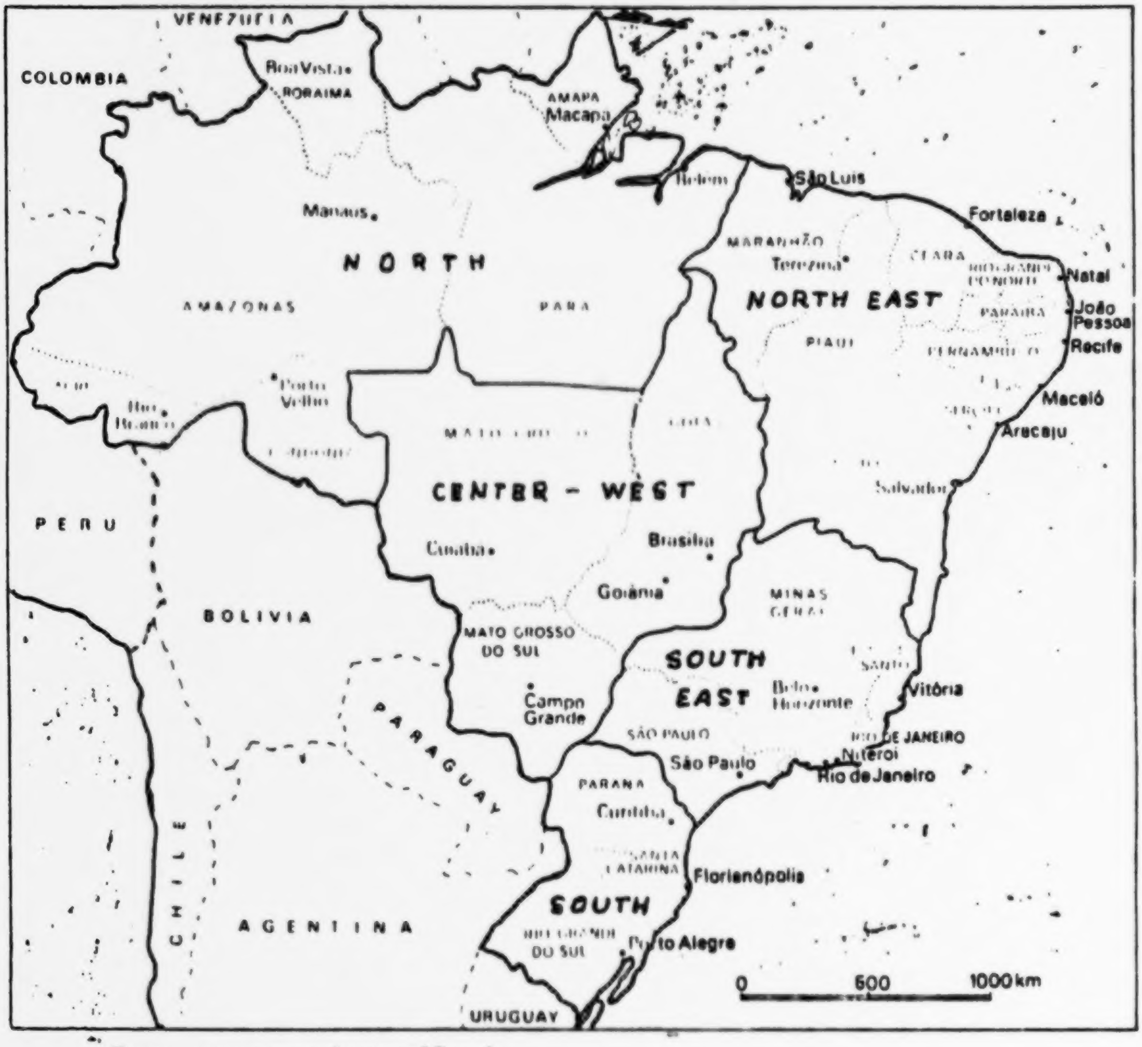
The green flag of Brazil has a central yellow diamond containing a blue globe representing the night sky seen over Rio de Janeiro (mirror image—that is, reversed). The curving white band has the national motto of which means order and progress, a fitting motto for this developing nation. The green color symbolizes Brazil's vast forest; the yellow and the diamond shape represent its great mineral wealth. The latest version of the flag was adopted in 1968. It contains 23 stars.

A Nation of Diverse Regions: Student Guide

Brazil is the fifth largest nation in the world. Although it is not usually ranked as one of the major powers in the world, it appears to have the potential to become a world leader in the future. Whether or not Brazil is able to fulfill that potential, depends on its ability to complete the transition from a "developing" nation to a "developed" nation. The history of Brazil's development clearly indicates that its transition into a developed nation will be greatly affected by strong regional forces that exist.

The republic of Brazil consists of 21 states, 4 territories, and the Federal District. These twenty-six political divisions are officially divided into five distinct regions. Each region has its own economic and social structure. All Brazilians are very conscious of regional differences and have even generated stereotypes for people who come from each region just as we tend to do for regions of the United States. Regionalism then has become an important factor not only in Brazilian politics, but also in the literature, art, and economics of the nation. To understand Brazil, a person must also understand its regions.

Therefore, the class will be divided into 6 groups (one group representing each of the five regions and one group representing the government national development committee). Each group will receive some background information and a map of Brazil with the regions marked as well as some project suggestions. Each group will select one of the suggestions or make one of their own and complete a worksheet that explains how the project will benefit not only their region but also the nation. The government committee will receive a map of all regions and its current background of needs and national goals. Each group will present its proposal to the government committee before the class. The government committee will decide which project or projects it will support and give reasons why to the class. The class will evaluate the results of the decision.


VENEZUELA
COLOMBIA
Boa Vista
RORAIMA
AMAPA
Macapa
Belem
São Luis
Fortaleza
Manaus
NORTH
AMAZONAS
PARA
MARANHÃO
Terezina
CEARA
Natal
NORTH EAST
João Pessoa
PIAUI
PARAIBA
Recife
Porto Velho
Maceió
Aracaju
CENTER - WEST
Salvador
PERU
Brasilia
Cuiaba
Goiânia
BOLIVIA
MINAS GERAIS
MATO GROSSO DO SUL
SOUTH EAST
Vitória
Campo Grande
Belo Horizonte
PARAGUAY
SÃO PAULO
São Paulo
Niteroi
Rio de Janeiro
PARANA
Curitiba
CHILE
SANTA CATARINA
Florianópolis
AGENTINA
SOUTH
RIO GRANDE DO SUL
Porto Alegre
0
500
1000 km
URUGUAY

The major regions and states of Brazil

Brazilian Development Council

Overview of Brazil

Brazilians believe that their nation in the future will be free, independent, prosperous, and a major force in world affairs. This view is shared by many other people in the world because of Brazil's large size and wealth of resources. However, Brazil faces many problems in trying to develop its potential primarily because its development has been dependent on foreign investment, technology, and knowledge. It is a nation that is trying to make the transition from "underdeveloped" to "developed" status. Although not a world leader yet, Brazil would like to see itself as a leader of Latin American nations. It would like to show the others how progress can be achieved through planned development.

The overall objective of Brazil's government is to achieve progress for the whole nation. This means that regional inequalities must be reduced in the interests of overall national well being. Development is seen as a multidimensional process that affects the whole country and all approving development plans include:

1. population affected
2. natural resources
3. means of production
4. goods and services needed
5. labor
6. transportation and communication links between the above

Also, the government is interested in plans that allow the nation to rely on its own resources rather than depending on outsiders for aid. Brazil's foreign debt is currently so staggering that it is beyond the ability of Brazil to pay even the interest on it and still provide for the needs of the Brazilian people.

Brazilian governmental leaders are sensitive to regional considerations, and special programs to stimulate growth in the poorer regions are certain to receive continued emphasis. However, there is also great interest in trying to relieve the shortages and congestion in the older areas of industrial concentration such as in the Southeast around the cities of Rio de Janeiro and Sao Paulo.

The Northern Region

Physical Description

The North is the largest region in Brazil, covering 42 % of Brazil's total land area. It covers nearly the entire Amazon Basin which contains the world's largest remaining rainforest. While a "basin" would seem to indicate that the land is low, most of the terrain is composed of highland terrain, there is much soil erosion. Hard pans develop on or just below the surface. Also, the remaining surface soils tend to be poor in quality due to leaching by the heavy rainfall. Dense vegetation, disease, heat, insects, and difficult transportation have caused this vast region to be described as Brazil's "last frontier".

Cultural Development

In the past, few people were attracted to this region. Today only 4 % of Brazil's population live in the North. Most of these people are concentrated in two cities: Belem at the mouth of the Amazon and Manaus up the Amazon. Various small Indian groups are scattered along the banks of the Amazon in the rainforest.

During Brazil's early history some missionaries penetrated the interior along with a few others who sought special forest products or went fishing and hunting. However, since the region is far from shipping lanes, and the hardwood trees are difficult and costly to cut, and the soils generally poor for farming, the region remained undeveloped for many years.

A rubber boom brought people and development from 1870-1914. During this time the region had a monopoly on the world's rubber market. British smugglers took rubber tree seeds out and successfully started producing rubber in Asia. The rubber boom snapped. During 1928, the Ford Motor Company tried to reestablish the rubber industry by opening plantations. Rubber continues to be produced but has not recovered the wealth made earlier.

Since the end of World War II in 1945, Brazilians have looked to this region as an area to be brought into the national economy. The vast reserves of timber, plant, and animal life, and enormous mineral deposits promise potential wealth for the nation if the area can be developed.

The government encouraged migrants from the drought-stricken North-East region to settle along the Amazon in the 1970s. Roads were built to make the area more accessible to the migrants. However, many settlers found themselves isolated, without electricity, water supply, health, or educational services, and on poor land unable to grow crops. As a result many settlers left with dreams and high expectations broken and unrealized. Such government programs in Amazonia suffered from lack of detailed information about the environment and from insufficient financial and technical resources to develop such a vast area at one time.

Regional Update

1. Currently, the North's economy is based on forestry, livestock (cattle), and mining.

2. Although rainforest soils are generally believed to be poor in quality, they have not been well studied. Some

areas have been found good for cattle grazing, while most require large quantities of fertilizer to keep the short grasses growing. If fertilizer is not provided, the soil eventually wears out and dust bowls develop.

3. In 1967 a chance discovery was made in a low range of hills called the Serra Dos Carajas (550 kilometers southwest of Belem) of large deposits of minerals. The minerals are of a quantity, quality, and variety beyond any comparable deposits known anywhere else in the world. The government began a new project called The Carajas Project to develop the iron deposits at this site which was scheduled to be under full production by 1987.

4. Near the Carajas mining project the government built the Tucurui dam and hydroelectric plant on the nearby Tocantins River. It is second in size to the Itaipu Dam in the Southeast but is very expensive to operate.

5. Conservationists worldwide as well as in Brazil are concerned about the impact of developing the rainforest area. Indian villages have been bulldozed to make room for road construction and mining development. The Yanomami tribe which is the largest remaining Amazon tribe is facing destruction as their traditional hunting and farming areas are being invaded by outsiders. Diseases such as flu, measles, and tuberculosis are decreasing their numbers as well.

6. Climatologists are concerned that destruction of the Amazon rainforest (largest on earth) could dramatically change the world's climate. The rainforest is responsible for putting more oxygen in the atmosphere than any other forest. It holds a great deal of moisture. Botanists and biologists are also concerned since the rainforest contains such a great diversity of life-forms that may not exist anywhere else in the world.

7. There is constant pressure to develop more sources of food, and an irrepressible belief among Brazilians that sooner or later a way will be found to turn the relatively unproductive five million square kilometers of the Amazon Basin into a bottomless larder (food source).

8. Oil has been found off-shore in the mouth of the Amazon Basin.

9. Rubber workers who live on the rubber plantations have been moved out as the land has been sold to mining and ranching interests.

The Northeastern Region

Physical Description

The Northeast is a large plateau whose surface is nearly flat due to erosion. Much of the Northeast is arid. Although there have been periods of severe drought in the states of Ceara, Rio Grande do Norte, and Paraiba, virtually all of this plateau suffers from the effects of drought. According to one source, this region has such an international reputation for periodic droughts, that many people believe the region's name should more properly be "the drought-stricken Northeast".

Due to the climate, the principal vegetation in this region is a drought-resistant scrub brushwood know as *caatinga*. The most desolate area of this drought-stricken region is known as the*Sertao*, where very little vegetation of any sort exists at all. A 1984 satellite survey revealed that in the center of the arid Northeast is a surprising fertile area of irrigatable land beside the Sao Francisco River and in the upland valleys of the *Sertao*.

Cultural Development

This region was one of the first areas in the New World to be colonized and was the first part of Brazil to be settled. In fact, Brazil gets its name from the Brasa trees (from which comes a bonfire-colored dye) that were abundant in this region.

Sugar cane, Brazil's first major industry, began in the Northeast. As competition from other sugar producing areas in the world caused the price of sugar to fall, people began drifting into the semi-arid interior of the region. Sugar continues to be a main crop grown in the region. This is especially true since one by-product that has gained popularity today is ethyl-alcohol. This fuel has been substituted for petroleum in nearly 50% of the automobiles in Brazil.

Other products were introduced to this region and continue to be raised today. They included: cacao (cocoa) in Bahia, long-fiber cotton, manioc, black beans, corn, and a number of crops used to make extracts such as tropical oils and waxes. The vast bulk of the land is divided in *fazendas*, vast private holdings used for raising cattle. Even though the region does not grow enough food to feed its people, the big ranchers have little interest in producing food crops when they can make more money shipping meat to southern cities.

Successive governments have tried to solve or tackle the numerous problems of this depressed region. The people of the Northeast have reacted to the area's problems by emigrating from the countryside to the cities on the coastal plain and many eventually go to the Southeast Region.

Although the region has been economically poor, it has long been culturally rich. Music, literature, poetry, and politics have flourished in the Northeast. The Northeast is the second most heavily populated region in Brazil with 29% of the people, but it also has the greatest amount of poverty. Once the dynamic area of Brazil, it is now a major problem area.

Regional Update

1. Following a severe drought in 1970 the government attempted to help the tens of thousands of peasants who were

driven off their land. The plan involved building a Trans-Amazonian highway in the Northern Region. People from the Northeast were hired to work on it and could be resettled along its length. By 1974, the plan was abandoned since the families were not provided with adequate housing for a rainforest area (they were given flimsy, prefabricated wooden houses with corrugated iron roofs) nor training for life in such a different area.

2. In 1984 a West German economist found that up to 20% of the funds provided by foreign investors to support a series of public works and increase employment opportunities were disappearing into the wrong pockets (usually into hands of large land owners) or being misused.

3. A new airport with an international runway has been built at Juazeiro.

4. At an agricultural research station in Juazeiro, researchers are testing irrigation techniques borrowed from Mexico and India and are experimenting with non-traditional crops such as sorghum and millet.

5. Most of Brazil's limited petroleum (5%) reserves are located around Bahia.

6. Large copper deposits were discovered in this region in the 1970s and are waiting to be developed.

The Central-West Region

Physical Description

The vast central interior, which includes the states of Mato Grosso, Goias, and the Federal District in which the capital Brasilia is located, is a frontier area. It occupies 22% of Brazil's area but is sparsely populated with only 6% of Brazil's people. This region includes vast stretches of forests and savanna grasslands. Mineral wealth exists in highland areas but has yet to be fully explored. The soils here are good but require addition of lime to prevent soil erosion and to ensure a good crop. Prosperous cattle ranching in the south of Mato Grosso and Gois states resemble ranching in the North.

Cultural Development

The Central-West Region began development during the 1700s when the discovery of gold started a mining boom. With the collapse of the mining boom, many of the early settlements either died or became isolated from the rest of Brazil. Toward the end of the 1700s, cattle-raising expanded into this region. Recently, agricultural expansion has resulted from the extension of railroads from Sao Paulo and Minas Gerais which opened markets in the Southeast. The building of roads in Mato Grosso, the construction of Brasilia (1956-1960) as the new national capital and the opening of the Belem-Brasilia highway in the 1970's stimulated growth and the movement of people into the region.

Most of the region's economic activity is in agriculture. In addition to livestock raising, it has become an important producer of rice, beans, corn, manioc, and coffee. Mining is a small but growing activity. Per-capita income has grown much more rapidly than the national average as a result of the government's efforts to move the economic center of the country farther into the interior.

Regional Update

1. During the 1960s, the Itaipu Dam on the Parana River (shared with the South Region) was completed. It is the world's largest dam and so far only 10% of its hydroelectric potential has been tapped.

2. The government policy of moving the capital to the interior has cost the nation a lot of money and remains one of the controversial topics of Brazil.

3. Most Brazilians used to regard the grasslands as only good for grazing. Research into the savanna's potential has revealed that it could become the second great agriculture powerhouse of Brazil. Its constant temperatures, adequate rainfall, large amounts of surface water, soil of good texture and adequate depth, and gently rolling plains appear ideal for mechanized agriculture. Research needs to continue to find ways to compensate for the acid quality of the soil and techniques to deal with the long dry winter season that lasts from May to September.

The Southeast Region

Physical Description

Physically similar to the South Region, the Southeast has the Serra mountain ranges running parallel to the coast. West of the mountains lies a large plateau covered in grasses and composed of good lava soils. East of the mountains is a narrow strip of coast where most of the people are concentrated in large cities.

Cultural Development

The Southeast is the economic heartland and the most highly developed region of Brazil. Occupying only 11% of Brazil's area, the four states (Sao Paulo, Rio de Janeiro, Espirto Santo, and Minas Gerais) of this region contain 42% of the population and receive 65% of the national income. Traditionally the money and political power of Brazil were centralized in this region. As a result, the social and economic facilities are far superior to any in the rest of the nation. However, there are poor areas within the region such as the shanty towns called *favelas* found in the large cities of Sao Paulo and Rio de Janeiro.

The economy of the region is based on industry, agriculture, mining, and services. The region contains Brazil's largest hydroelectric plants, its largest oil refineries, iron and steel plants, all of Brazil's automobile and tractor factories, almost all the chemical industry, most electrical appliance and machinery, manufacturing, and many types of consumer industries. Agriculture is highly diversified and operates at the highest technological standards for the country. In mining, iron ore is most important. The vast ore deposits in the state of Minas Gerais supply most of the ore for Brazil's exports and domestic consumption. Minas Gerais means "general mines" and contains 1/4 of the world's supply of iron as well as large deposits of gold and diamonds.

Sao Paulo is the economic phenomenon of Brazil. It is the nation's leading producer in both agriculture and industry. It has become the third largest city in the Western Hemisphere after New York City and Mexico City. It arose as a commercial and industrial center for the coffee region and as the political center of Brazil's richest state.

Rio de Janeiro started as a major port for shipping gold (from Minas Gerais). It grew quickly into a major economic and cultural center and until 1960 was the national capital. Rio is second only to Sao Paulo in industrial activity and a leading center of commerce, finance, foreign trade, and shipping. Its striking beauty, warm climate, and sandy beaches make it one of the world's tourist meccas.

Regional Update

1. The best railway links between cities exist between Sao Paulo and Rio de Janeiro.
2. The densest road networks are in this region.
3. Even though the government shifted the political capital to Brasilia in the Central West Region, the political and economic power of the Southeast has not declined. Sao Paulo city still acts as the financial capital of Brazil.
4. Oil is a major energy base for industry, transport and some domestic consumption in Brazil. Forty-five percent of energy requirements of Brazil are met by crude oil. In 1980, Brazil imported over 80% of the oil it needed. Paying for this oil is a drain on the national economy. Oil has been discovered off-shore near Rio de Janeiro.
5. During the 1980s Brazil has begun manufacturing jet fighters for export.
6. Japanese immigrants who first came to work on the coffee plantations in the late 1890s introduced soybeans. The Japanese community is now the largest Japanese community outside of Japan and Brazil is one of the largest exporters of soybeans in the world.

The Southern Region

Physical Description

Three small states (Parana, Santa Catarina, and Rio Grande do Sul) form the Southern Region of Brazil. It is similar in physical composition to the Southeast region. The Serra mountain ranges run parallel to the coast. The interior is an open grassland plateau composed of layers of lava that have been weathered to form rich soils. This region has a subtropical climate with occasional snow in one location—the mountain town of Sao Joaqauim in Santa Catarina.

Cultural Development

Because of the moderate climate and fertile soils, the major occupations in this region have been in the fields of cattle raising and diversified farming. Agriculture is particularly important in the states of Parana and Rio Grande do Sul, while industry has been more important in the state of Santa Catarina. Parana has been the fastest growing state in Brazil and has become the leader in coffee production, accounting for more than half of the country's total coffee output. Forestry is also important in Parana due to its many pine trees. Rio Grande do Sul is the major producer of wheat, rice, onions, tobacco, and soybeans. It is also the second most important Brazilian state in the raising of livestock. This state is also important industrially in the manufacturing of wood, paper and pulp, food processing, and leather products. The state of Santa Catarina is the principal coal producing state in Brazil and is important in both industry and agriculture. The coal mines in Santa Catarina are Brazil's main deposits and the only ones being commercially exploited. The quality of the coal, however, is too low to be used for metallurgical purposes and must be mixed with substantial portions of imported coal.

This region covers approximately 7% of Brazil's total land area. It is the home for 18% of Brazil's population. (See the table on Brazilian Statistics.) Although it is the smallest of Brazil's five main regions, the South is still larger than any West European country.

Colonized first by Portuguese from the Azores Islands and then by Europeans of various countries (Germans, Italians, Poles, land Russians), the South developed a way of life more similar to that of the North American pioneers than to the culture which developed in the rest of Brazil. In spite of the fact that European immigrants began arriving in the South in the early 1800s, much of the region is rural and somewhat of a frontier area. However, though it is a "frontier" area in some respects, this region shares with the South-East the densest road network in Brazil.

Regional Update

1. Beginning about 1970, the State of Rio Grande do Sul has become a major exporter of shoes.

2. Beginning around 1970, Parana began to attract many technologically advanced industries as an overflow from the Sao Paulo area in the Southeast region.

Regional Analysis and Plan Development Worksheet

Region: ________________________________

Members of the Regional Agency:

1. ______________________ 4. ______________________
2. ______________________ 5. ______________________
3. ______________________ 6. ______________________

1. Is this region important to the nation of Brazil? Explain.
2. What resources are available in this region?
   a. Human
   b. Natural
3. What needs to be done in this region to:
   a. improve life for the people who live there?
   b. make it more equal with other regions as part of the nation of Brazil?

Examine the following list of possible development plans and select one that would be suitable for your region or make own of your own. Then complete the Proposal Guide. When you make your presentation before the government "Development Council", use information from this worksheet to introduce your plan, describe your plan, and hand your completed proposal sheet to the council.

Possible Development Plans

An industrial factory
A center for scientific research
A national park, zoo, or museum
A shopping mall
A convention center
A university

A new highway or railroad
A low-income housing project
An airport or harbor
A sports arena
An electrical power plant

Proposal Guide

Region: ______________________________

Brief description of plan:

1. Population affected:

2. Natural resources:

3. Means of production:

4. Goods and services needed to make the plan work:

5. Labor:

6. Transportation and communication links:

We believe that the government should support this proposal to develop Brazil because:

THE GREENHOUSE EFFECT: A PROBLEM OF PEOPLE - ENVIRONMENT INTERACTION

JUNIOR HIGH

The Greenhouse Effect, which may change the earth's climate dramatically over the next several decades, is caused by the accumulation of certain gases (especially carbon dioxide, which comes from any form of combustion, and industrial chemicals such as freon called chlorofluorocarbons) in the atmosphere. The net effect is to tip the earth's energy in the form of warmth. A package of related teaching approaches for the Greenhouse problem includes: 1) simple description, especially aimed at explaining how the effect comes about from human activity, why we are still uncertain about its impacts, but why we must start now to worry about it; 2) alternative future scenarios, that teach students how to explore potential futures and solutions, and to assess their costs and benefits; and 3) global problem solving in which students propose policies for nations and the global community aimed at making the type of changes in human activities that can either lessen the Greenhouse Effect or better prepare the world for its impacts.

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The Greenhouse Effect has several special characteristics that make it a particularly bothersome problem for people on earth. First, there is great uncertainty as to the timing, magnitude and distribution of its effects on climate. The uncertainty includes difficulty in forecasting future releases of Greenhouse Gases, which are related to future energy use, deforestation rates, and industrial activity, as well as the uncertainty of exactly how these gases will affect the climate. some parts of the world might become warmer, drier, cooler or wetter. Meteorologists still cannot predict the impact precisely, although the general principle of warming is well accepted. Next, the impacts of these climate changes on natural resources like agricultural production, water supply, forests, and aquatic ecosystems are difficult to forecast. Nevertheless, the "Greenhouse Climate" that might prevail by the middle of next century is likely to be different than that experienced since the dawn of civilization, more than two thousand years ago. And, these climate changes may begin to be noticeable over the next few decades.

Thus, there is a need for the governments of the world to act now either to try to prevent the Greenhouse Effect or to adapt to its potential impacts on climate. Just how we might do this is the main problem to be solved by scientists, resource managers, and political leaders. The Greenhouse problem is also a good tool for teaching about the relationships between people and the natural environment. It encompasses all of the aspects of some of the most enduring and disturbing environmental problems of our time: great uncertainty, the potential for serious, long-term effects, some of which may not be apparent until well off into the future, and the need for cooperation between nations if a solution is to be implemented. The Greenhouse Effect is one of a set of environmental problems relating to the "Global Commons." In this case, the atmosphere becomes a common dumping ground for pollutants that may, in turn, change the world forever. A package of related teaching approaches for the Greenhouse problem includes: 1) simple description, especially aimed at explaining how the effect comes about from human activity, why we are still uncertain about its impacts, but why we must start now to worry about it; 2) alternative future scenarios, that teach students how to explore potential futures and solutions, and to assess their costs and benefits; and 3) global problem solving in which students propose policies for nations and the global community aimed at making the type of changes in human activities that can either lessen the Greenhouse Effect or better prepare the world for its impacts.

I. How does the Greenhouse Effect work?

A. The Sun emits electromagnetic radiation, light is only a small part of the types of radiation.

1. All wavelengths travel at the speed of light: 300,00 km/sec.

2. In general, the wavelengths become shorter as the temperature increases.

3. All objects will emit radiation if they are warmer than the surrounding area.

4. The Sun heats the Earth, which becomes warmer than the air around it, so it will emit radiation, but in much longer wavelengths than the majority of radiation from the sun.

5. The bouncing off of these longer wavelengths of energy, mostly infrared radiation, from the Earth's surface is often referred to as the Albedo Effect.

6. The long waves of radiation are absorbed by gases in the atmosphere, and are not passed back out through to space.

7. Examples of the gases which trap heat are: carbon dioxide, water vapor, freon, methane products, industrial solvents.

8. Therefore the heat is trapped in the lower part of the atmosphere, called the troposphere which is 0-16 kilometers above the surface, and makes the Earth a comfortable place to live.

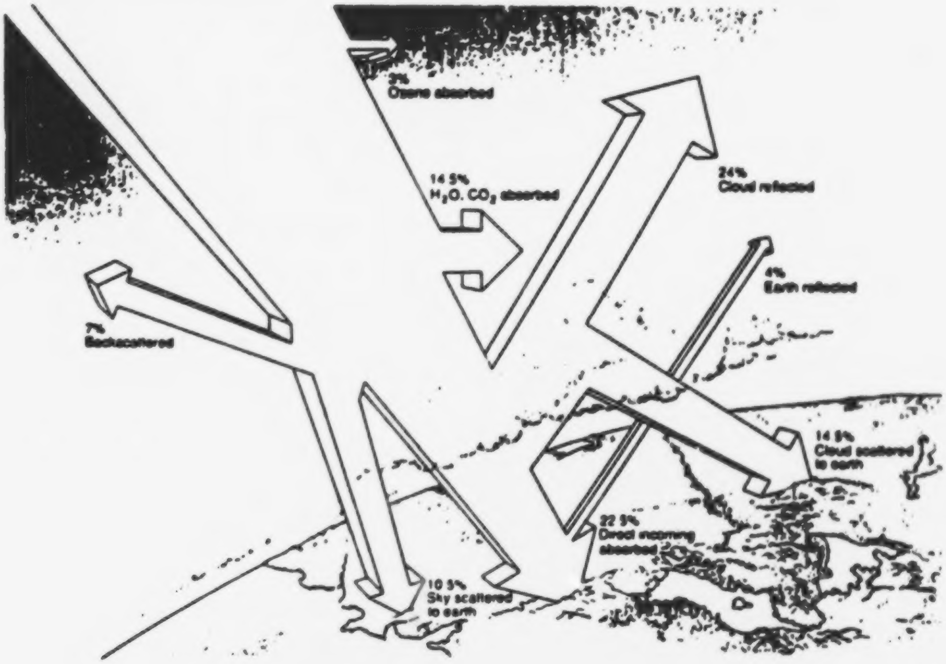
B. Greenhouse Effect on Climate

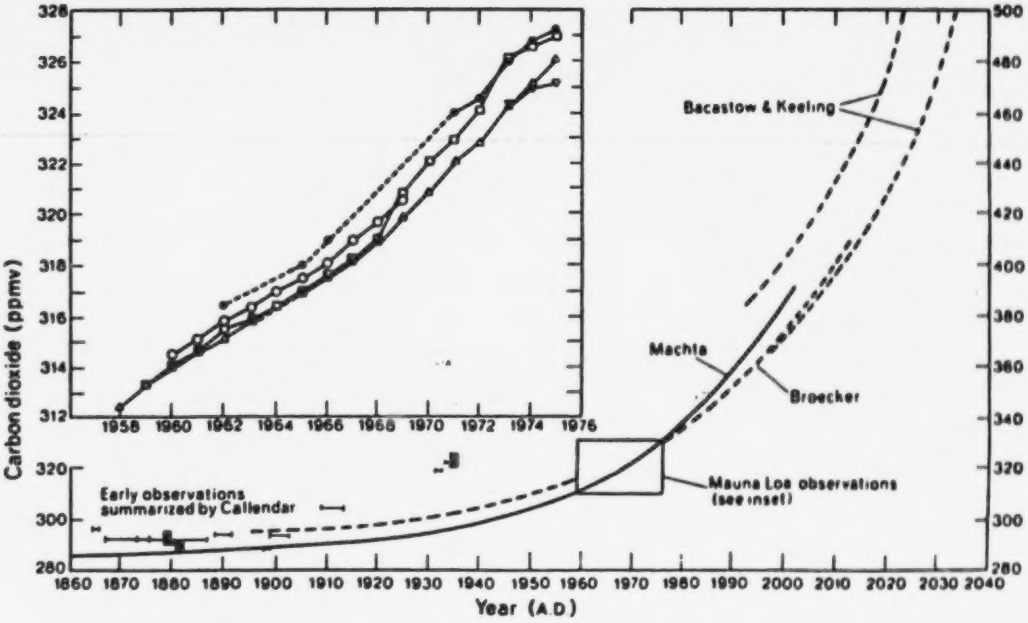
1. Because the Earth is surrounded by this fluid gas layer which traps heat in, the whole Earth exchanges the heat absorbed, through rotation of the earth and weather patterns.

2. The spherical nature of the Earth dictates the angle of the sun's rays that hit the Earth. The more direct the rays, the more heat is absorbed (i.e. the equator absorbs and emits more rays than the poles, it is warmer at noon than at dusk). This is called the angle of insolation.

3. Because of the current percentages in the radiation budget, we can live and adapt to most climates on Earth. If those percentages change because of man's influence, then we could have an environment where the average temperature could rise from 1.5 to 5.5 degrees Celsius.

4. It has been proven that an increase of carbon dioxide in the atmosphere will cause the atmospheric temperature to rise.





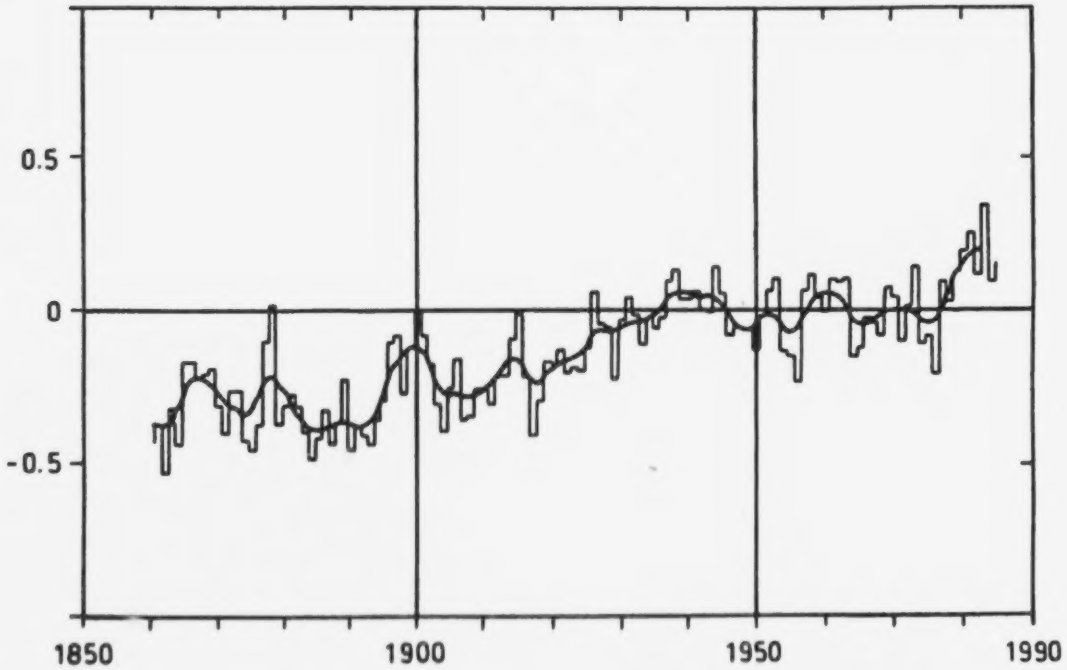


Figure 1.5 Variation with time of the global mean annual surface temperature obtained from land and marine temperature records. The filtered curve has been obtained by suppressing variations on time scales less than 10 years

II. Where Does CO_2 Come From and How Does Human Activity Increase the Greenhouse Effect?

Carbon Dioxide and the other so-called Greenhouse Gases which threaten to change the climate over the next several decades come from a variety of sources. The largest source of atmospheric CO_2 is fossilized carbon stored in coal, oil and gas deposits. The second largest source is the biomass of living material on the earth's surface, especially the forests, which give off their store of carbon during decomposition.

Human activity is helping to liberate carbon from these sources at greater than natural rates. The largest impact is the mining and burning of fossil carbon for energy. This yields about 5 gigatons (or 5 billion tons) of carbon a year. Next, deforestation, which leads to decay and CO_2 release of a significant portion of forest biomass, and land clearing and soil cultivation for agriculture, add another 2 gigatons to the atmosphere's carbon budget. Finally, other uses of petrochemicals, as in agricultural fertilizers, release carbon to the atmosphere. Current CO_2 concentrations are at about 343 parts per million (ppm), a 25% increase from the preindustrial value which has been estimated at between 285 and 290 ppm. The concentration of CO_2 is increasing at about .5% per year.

Other Greenhouse Gases, especially ones called chlorofluorocarbons (CFCs) like freon, are produced by human for industrial purposes (e.g., air conditioning, spray-can propellants, and cleaning solvents). These are released through manufacturing and, of course, the use and discarding of consumer products carrying the material (e.g., junked car air conditioners). They are growing at about 5% per year. finally, some methanes come from organic decay in flooded rice paddies (swamp gas"), which are expanding as part of the effort to better feed the world's population, and from the process of digestion in almost all mammals (e.g., cattle). These gases not only enhance the Greenhouse Effect, but they may be causing a dimunition of the protective Ozone Layer.

III. How Large Might the Greenhouse Effect Become?

To answer this question one must follow and analyze each linkage in the "chain of causality" between human activity and increases in the atmospheric quantity of carbon dioxide and other trace gases. The chain can be conveniently thought of as containing four chief links. Working backwards, we could say that:

> How much the climate changes depends on how much carbon dioxide is poured into the atmosphere over the next several decades.
>
> Carbon dioxide levels depend chiefly on energy use.
>
> The use of energy depends on population and economic growth.
>
> The rate of future population and economic growth depends on a large set of uncertain factors: the availability of resources, new technologies, political changes, war, disasters, etc.

Each step in this chain contains many unknown factors, and this aspect of the Greenhouse problem allows the student to explore the nature of uncertainty. Two types of uncertainty are involved. The first involves the scientific uncertainty common to complex problems about which our current understanding is limited. Atmospheric scientists do not know precisely how the climate will change due to different amounts of Greenhouse Gases, though they have developed ways of extrapolating this. The remaining uncertainty can be loosely termed future uncertainty, and refers to the simple fact that predicting the future (of population, economic growth, political changes, etc.) is a very risky business. One economist offered a way of gaining insight about future uncertainty:

> A useful exercise is to project ourselves 75 to 100 years into the past and imagine how different life is now, with its blessings and its problems, from what we might have expected had we been concerned, toward the end of the last century or the beginning of this one...
>
> Anyone can amuse himself with a list of technologies, political events, and demographic and environmental phenomena that would be most startling to students of social policy at the turn of the last century. Electronics was not dreamed of. Electric light would have been new in our lifetime and unknown to most of our countrymen. There was telephone but no radio. Nuclear energy...was way over the horizon. Transatlantic travel by zeppelin was a generation in the future...there were no antibiotics...and yellow fever had caused abandonment of the Panama Canal.....US life expectancy at birth was 47 (it is now 74).

Great changes have occurred since 1900, and many have affected how we use energy and other natural resources. The energy crisis of the 1970s put a damper on the rapid growth in energy use experienced during the post-World War II years of growing affluence. Plastics replaced natural materials for several purposes, yet forests were still being cut down to make room for pastures to produce beef for fast-food hamburgers.

But, perhaps the biggest future uncertainty isn't technology, but simply how many humans will be on the earth. Social scientists are uncertain how large the population of the earth will become over the next 50 years, though most projections expect the current 4 billion population to increase and eventually stabilize at around 6-7 billion. Energy engineers and economists are uncertain how much energy will be used as the population increases; this depends on how efficient our use of energy becomes. some scientists suggest that the US could cut it use of energy by 25% without lowering quality of life or economic production by making use of all of the energy-saving techniques currently available. But, even if this increase in efficiency were to occur in the industrialized countries, it is difficult to say whether the rest of the world will become more or less efficient in its use of energy.

The rate and ulimate level of economic development in less developed countries is the most uncertain aspect of the future. Right now there exist huge differences in level of development that are reflected in food and energy consumption and, of course, release of Greenhouse Gases. In North America and Europe, people use about 11 kilowatt-hours (kW) of energy a year. This is the total use divided by the population, and includes all industrial uses, transportation, home heating, lighting, and incidental uses. for two-thirds of the world's population the average is less than one kW/year, and the world average is roughly 1.5 kW/year. The total global use is now about 7.5 tera watts (TW/year (7.5 trillion watts, or 7,500,000,000,000 watts/year).

The big question becomes how much energy will be used in the future, which depends on the level of economic development, population growth, and energy efficiency. We suggest that students be asked to consider three alternative future scenarios, which might be thought of as an optimistic future, a middle-of-the-road future much like today but with more people, and a pessimistic future. The nice aspect of predicting the future is that no scientific and technical skills seem to be most useful; the future is almost anyone's guess and students can build scenarios that are as credible as ones carefully constructed from social scientific theory:

Scenario 1: The Optimistic Future It is the year 2050 and the global population has leveled off at 7-8 billion people. Biotechnology has produced enough food to feed this number, no major wars or famines have occurred, and most people live a lifestyle as good or better than than enjoyed in 1987 by only the most industrialized countries (e.g., western Europe, the U.S. and Canada, and Japan). That is , most people have adequate food, homes with electricity, heating and/or cooling, indoor plumbing, and access to convenient transportation. Average per capita energy consumption is 15 kW/year, more than in the U.S. during 1987, and bout what some European countries were using then. Energy efficiency has increased by 10-20% due mostly to super conductor technology. Total global energy use is 50 TW/year, which releases as much as 20 gigatons of carbon a year, and the concentration of carbon dioxide and other Greenhouse Gases is now nearly 800 ppm, more than twice what it was in preindustrial times.

Scenario 2: The Middle-Road Future The largest change in 2050 is that the population growth has slowed due to war, famine and disease. Nevertheless, 6-7 billion people live in a world divided, as in 1987, between the "haves" and the "have nots". The haves use up to 15 kW/year of energy, have two cars, air conditioning, etc., and live in economies dominated by service industries. The rest of the world still suffers malnutrition, lack of access to shelter, transportation or other necessities; they use less than .5 kW/year, mostly to cook food. Total energy use is now 30 TW/year, and the concentration of carbon dioxide and other Greenhouse Gases is now 500 ppm, a 75% increase from preindustrial times.

Scenario 3: The Pessimistic Future The population has grown to 8 billion people, and the strain on the global economy has caused a loss of quality of life in both the industrialized and less developed countries. Few countries have the resources to use up to 10 kW/years per person, and they still have cars, electricity and air conditioned homes; but 7.5 billion people use .5 kW/year simply trying to grow food and cook it. Resources are about to run out and even the most well-off countries are beginning to experience food and energy shortages. Total energy consumption is roughly 20TW/year, and the concentration of carbon dioxide and other Greenhouse Gases is less than 400 ppm, not much higher than was observed in the late-20th century.

There are other uncertainties about future energy use and economic development that are worth exploring as students develop these scenarios. One is the mix of energy sources—oil, gas, wood, nuclear, solar, etc.—from which the future world will get its energy. The current rough mix of these sources adds about 5.3 gigatons of carbon to the atmosphere each year. More nuclear or some new, carbon-free technology might change this picture. There are also the "other Greenhouse Gases" like freon and various industrial solvents to worry about. Though they occur in quantities much smaller than does carbon dioxide (e.g., 1-10 ppm), together they may enhance the Greenhouse Effect by 50 to 100%. It is probably safe to conclude that, without some conscious policy to limit their production, these other gases will increase along with the economic development that leads to greater energy use, and their effect on the Greenhouse Effect might double the effect of carbon dioxide alone.

All this leaves us with a broad band of projected Greenhouse Gas concentrations ranging from 375 ppm to perhaps over 600 ppm by the year 2050.

What are the Impacts on Climate?

Now that we have laid out three alternative futures for the world's development to the year 2050, we can use current understanding of the Greenhouse Effect to project how different the climate might be then. But current atmospheric models are only good enough to provide a broad picture of how much warmer the climate of the northern hemisphere might be in the average year under increased CO_2.

The average temperature of the northern hemisphere has warmed by roughly .5 degrees C since the late 1800's. Projections for how much warmer it might bet if the Greenhouse Gases double range form 1.5 to 5.5 degrees C, or 2.7 to almost 10 degrees F. To put this in perspective, note that the warmest summer (June-July-August) in the Denver area in recent years (1980-667.1 F) averaged only 2.7 degrees F warmer than the coolest recent summer (1985-67.1 F). If one realizes that the coldest winter in recent times (how about 1983-84) was only 6.5 F colder than the warmest (1976-77), and thinks how different these were in terms of your heating bills, the amount of snow in the mountains, and subsequent problems with water shortages, etc., then one begins to get a feel for the average differences that might be caused by a doubling of Greenhouse Gases in the atmosphere.

But meteorologists do not know what the actual pattern of temperatures over the northern hemisphere might be. One suggestion comes form global circulation models run on super computers to simulate how the atmosphere will act if CO_2 were doubled. Note that summer and winter temperatures are roughly 2 degrees F warmer in the middle and western US. These are very rough numbers, and scientists place even less credence in projections of precipitation changes. soil moisture, which reflects rainfall in the models is up to 1 cm (just under half an inch) less in summer, and 2 cm (just under an inch) more in winter, suggesting that much of the interior mid-latitude continents (like the central and western US) may have more summer droughts. How such changes might affect society is the topic of our next section.

IV. How Might a Change in Climate Effect People and Society?

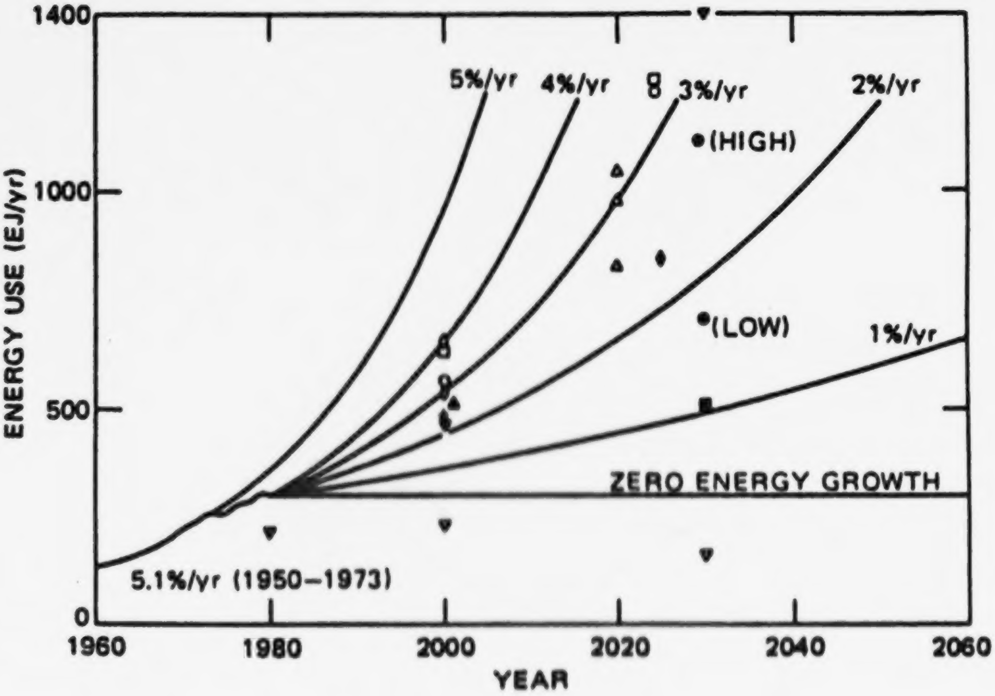
A. With knowledge gained by this point, students should be able to suggest some ideas about the effects of climate change on people and society. We suggest a list of topics be formulated by either:

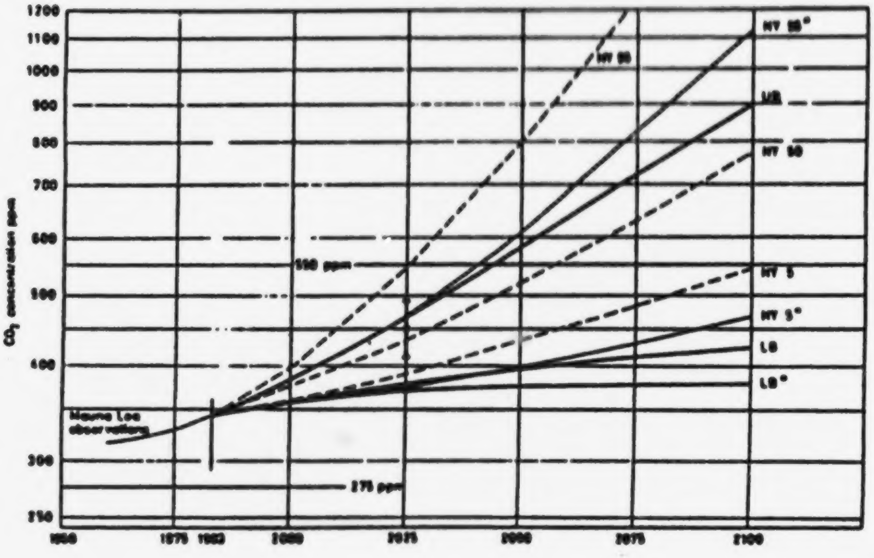
1. a class brainstorming session or
2. lists generated in small groups.

B. These topics could then be discussed briefly and divided among small groups for more complete analysis. Each group would then deliver a short presentation of their topic.

C. Topics that should be included:

1. Water Resources
    a. Change in precipitation patterns, therefore a change in
        1. cloud coverage
        2. erosion patterns
        3. river courses
    b. Change in temperature could cause melting of polar ice caps and glaciers which would
        1. change sea levels
        2. cause drainage into oceans to change
        3. increase the salinity of fresh water near sea level
    c. Change in temperature of ocean water would cause thermal expansion of sea water molecules causing a rise in sea level.
2. Agriculture
    a. Change in climate and weather patterns would cause
        1. change in crops
        2. change in farming techniques
        3. possible shift in the world's "bread baskets"
    b. Possibly cause more deforestation
3. Construction of Shelters/Clothing
    a. Change in how buildings are cooled
    b. Change in the types of construction
    c. Possible migrations of large human populations causing need for more construction
    d. Change in clothing to keep cooler
4. Energy Use/Economics
    a. Need to make desalinization of sea water more feasible
    b. Change from burning fossil fuels to renewable resources or nuclear power
    c. Change in emission standards for automobiles/factories to reduce carbon dioxide and particulates
    d. Use more mass transit and electric vehicles
    e. Adjust income distribution for those most effected by the change in the climate
5. Ecosystems/Wildlife
    a. Change in fisheries and sea life
    b. Change in coastal marshes/swamps/wetlands
    c. Climate variations could effect all ecosystems
6. Land Use
    a. Need to build dikes and dams around major populated sea coast areas
    b. Deserts might expand (as seen in northern Africa)
    c. Agricultural areas could change


1400
1000
500
0
ENERGY USE (EJ/yr)
5%/yr
4%/yr
3%/yr
2%/yr
1%/yr
(HIGH)
(LOW)
ZERO ENERGY GROWTH
5.1%/yr (1950–1973)
1960
1980
2000
2020
2040
2060
YEAR


1200
1100
1000
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800
700
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300
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CO_2 concentration ppm
HT 50°
HT 50
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Mauna Loa observations
275 ppm
1950
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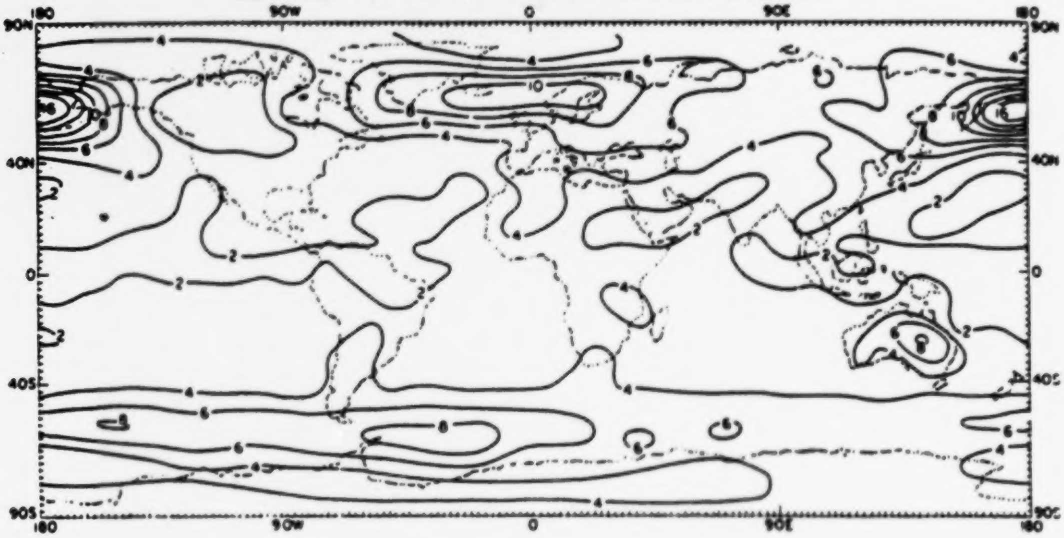
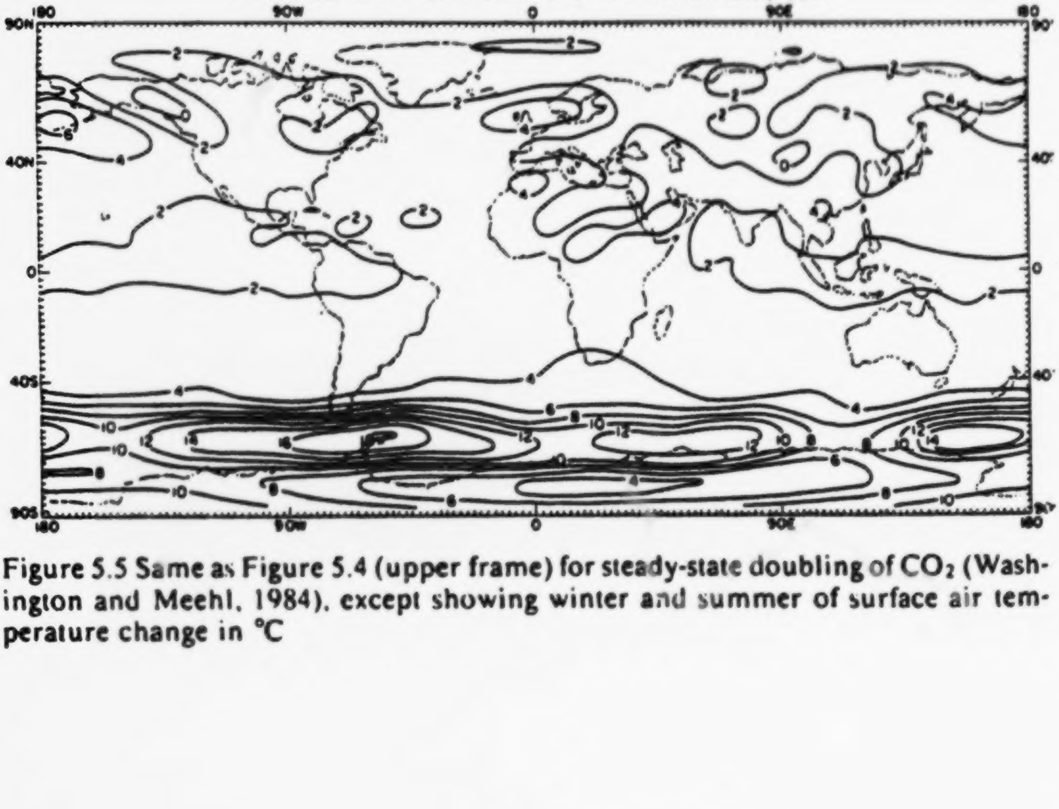


(a) SURFACE AIR TEMPERATURE DIFFERENCES, DJF

180
90W
0
90E
180
90N
40N
0
40S
90S



(b) SURFACE AIR TEMPERATURE DIFFERENCES, JJA

180
90W
0
90E
180
90N
40N
0
40S
90S

Figure 5.5 Same as Figure 5.4 (upper frame) for steady-state doubling of CO_2 (Washington and Meehl, 1984), except showing winter and summer of surface air temperature change in °C

V. How Should We Respond to the Greenhouse Effect and the Possibility of Global Warming?

A. This is the ultimate question. We suggest that you have the students conduct a simple benefit/cost analysis of the following options. A benefit/cost analysis is a weighing o f the positive and negative aspects of any environmental problem and its solutions. The simple goal in all cases (i.e. form the building of dams for water supply to efforts to clean-up the environment), is to achieve a benefit/cost ratio of 1.0 or greater. These could be listed on the overhead or on sheets of butcher paper as a discussion developed ideas. As the actual money figures would be hard to estimate, a simple listing of the benefits and costs which are assigned a numerical ranking (i.e. 1, 2 & 3) should be used.

B. The Earth inhabitants have apparently tow broad choices in this world wide problem. These are to adapt to the changes created by the Greenhouse Effect or to try and prevent them.

C. This is a list of possible topics that you students could do a benefit/cost analysis on:

1. Adaptation
    - a. air conditioning
    - b. crop change
    - c. moving cities/populations
    - d. building dikes/dams
    - e. weather modification
2. Prevention
    - a. burn less fossil fuels
    - b. extraction of carbon dioxide form the atmosphere
        1. reinject into geologic formations
        2. inject deep into oceans to be absorbed
    - c. addition of scrubbers to combat carbon dioxide emissions
    - d. reforestation
    - e. use more nuclear reactors (fission and fusion?)
    - f. possibility of a super conductivity breakthrough
    - g. others?

Prospects and Conclusions

The Greenhouse Problem is a member of a special set of global environmental problems with common characteristics—these might be called problems of the "global commons". We all use the atmosphere as a common-property resource—it is owned by no individual or group, but, some groups' uses may actually degrade the commons resource and threaten its worth to all users. This is what biologist Garrett Hardin called the "tragedy of the commons". In the Greenhouse case, it could be argued that the industrialized nations are abusing the resource to the detriment of all the planet. Other important characteristics of the problem are that:

its impacts are uncertain,
they are in the future (and thus are easy to neglect), and
there is no easy technological solution
effective response requires international, even global, cooperation.

These aspects do not fit well with our attitude that science can eventually find answers to all questions and solve all problems, with the world scene of uncooperative nation-states, and with political decision-making processes that stress short-term solutions to only the most glaring current problems. Similar environmental problems include acid rain, ocean pollution, species extinction (the whales, for example), ozone depletion, and pesticides. Some of the possible mechanisms that might help solve these problems are:

international conventions (the proposed CFC convention)
unilateral actions as example (Sweden's nuclear power policy)
import/export controls (e.g., rare animal products, pesticides)
compensation (any good examples here?)

We think students should be encouraged to think about such problems and to explore new ways to solve them. The future scenario is an especially useful tool. Building scenarios should give students an idea of the nature of scientific and future uncertainty, and the difficulty of solving global environmental problems. If conducted within logical guidelines as to what is a reasonable future scenario (e.g., just how much energy might be used as the developing countries become more like the industrialized nations), the creation of alternative futures gives the student a sense of just how different the world might be in several decades. By asking students to propose and explain possible solutions within certain guidelines (e.g., to be effective, solutions to the Greenhouse problems must meet the test of benefit-analysis), and by noting the difficulties of getting international cooperation to solve "global commons" problems (e.g., see the example of international whaling and ozone depletion agreements—how have they fared?), we will provide the student with a new appreciation on the global environment and peoples' relationship to it.

HOW TO MURDER YOUR HOST: THE DEMISE OF A PLANET

SENIOR HIGH

Marianne Kenney
Overland High School, Aurora, Colorado

The objective of this simulation, written in the form of a murder mystery play, is to investigate the environmental problems that endanger the delicate balance of the earth's life support system. To the ancient Greeks, Gaia was the Goddess of the Earth, and there is a current hypothesis that we are inhabiting a "living planet." This "murder mystery" encourages us to consider that we may be killing Gaia, our home planet. The players in this mystery are personifications of some of our world problems: war, overpopulation, ocean pollution, and rapid consumption of resources such as land and fossil fuels. These are the "suspects" in the murder of Gaia. This is of course a highly complex and emotional problem. If you and your students disagree with the ending I have written, change it. I relied on a single source for the content: Gaia: An Atlas of Planet Management, edited by Norman Myers (1984).

Materials

•Playbill (a copy for each student as they assemble for play)

•Script (a copy for each actor, except for Gaia, who has no speaking part: if time permits, encourage the actors to memorize their lines)

•Blank report of Angela Landscape (a copy for each student, to be handed out during the play by Angela)

•Sample questions to plant in audience (cut up and give one to each of five students prior to the play; instruct them to ask these of the actors when Angela Landscape says to the audience, near the end of the play, "Perhaps you should ask them some questions."

•Costumes, stage set, and anything else that might enhance the drama, fun, and learning, as you see fit.

PLAYBILL

You are about to become a witness to a murder. You will want to work together to solve the crime.

THE SCENE:
A Gathering At a Worldwide Housewarming

THE PLAYERS:

REMAXIMA VAN SKAAK
A high-powered real estate women. . . has scheduled a meeting with Gaia and her auditors.

HERR BLITZKRIEG
A rigid military type. . . has received fame and fortune for his heroic activities, but has a paranoid fear that others are plotting against him.

HOW TO MURDER YOUR HOST: THE DEMISE OF A PLANET

VICTORIA UNPRINCIPLED
A Southern actress acclaimed for her maturing talent and classic profile.
Gaia is to meet with her for a chat.

ANGELA LANDSCAPE
Author of "Geography She Wrote" and an amateur private detective. Has an uncanny ability to see through people's false fronts and find out their real motives.

GAIA
She has organized a lavish weekend party to celebrate acquiring such a lovely home, not suspecting that some of her closest friends might have hidden agendas of their own in maintaining their friendship with her.

SPRING RITE
The proverbial "dingy" actress, but she has achieved some recent success for her latest movie and a widening circle of influential friends. . . wants Gaia to help promote a sequel to her last movie, "The Numbers Game."

CAPTAIN AHAB
A man of great submerged wealth, but also rumored to have underworld dealings of a most deplorable nature.

Script

(Lights go out for 30 seconds, then lights come on and Gaia is found lying on the floor by Victoria who is upstage. In the back of stage are Ahab, Blitz Krieg, Remaxima, and Spring.)

Victoria: It's too late, she's already dead; but wait, maybe we can save her. Let's get her out of here. (Gaia is carried out by Ahab and Blitz Krieg, and as this happens, Angela comes in and inspects the body. She snoops around. Ahab and Blitz Krieg return to rear of stage after taking Gaia off.

Victoria: (to Angela)
What are you doing here and who are you?
Angela: I'm Angela Landscape, the detective. Who was that?
(Keeps snooping).

Victoria: Gaia is dead.

(At first Angela is looking for clues.)
Angela: (to the audience) Perhaps you can help in the search for clues.
You will be working in groups. Each one of you has a name tag with a color. Match your color with your partners. Go around the room and look for clues like any good detective, but don't touch. I'll meet with you again in five minutes when I whistle.

(Suspects on stage. They will put on name tags as each one is questioned by Angela.)

Angela: (to audience)
Hang on to the list of clues; We have some pretty obvious suspects. We ought to get the basic facts straight so I can fill out some kind of report. Perhaps you'll help me fill out my report.
(Angela passes out copies of report to audience.)

Angela: (to audience)
I'd like to ask your help in deciding which of these witnesses is lying and may have caused Gaia's death. Let's examine these witnesses. You keep notes from the evidence you hear and see on the report form I've given you.

Angela: Who are you?

Blitz Krieg: I'm Herr Blitz Krieg. I work for international security systems. Do you understand. . . able-baker.

Angela: Where were you at the time of the crime?

Blitz Krieg: I was at a Soviet-American Summit Meeting. We must convince people to be realists. Humans fight with each other and that is that. Protection comes from power, from making the other side fear and respect your strength. Those ban-the-bombers are well meaning but naive idealists. We must be strong so that we can feel secure. Nations must build up their arsenals and look for new weapons to make them stronger than their opponents. The bomb is really a peace maker. Think about it; since the atom bombs were dropped in Japan in 1945, there has not been an all-out war between the great powers. There have been a lot of little brush-wars, but no world war.

Angela: Why were you here?

Blitz Krieg: I needed to convince Gaia her survival depended on weapons build-up. No one should down-play the effects of a nuclear war but people shouldn't exaggerate either. No one is sure what would happen in a nuclear war. I was here to tell Gaia that humans would survive and life would go on. Remember, one of the most fundamental responsibilities of our government is the preservation of national security!

Angela: What do you know about the other witnesses?

Blitz Krieg: Victoria Unprincipled is the type of woman who will never be faithful. She's run out on every man who loves her. She takes them in, gets them to spend huge amounts of money on her, gets them to be dependent on her, and then they wake up one morning to find empty barrels. A very slick character. I'll have to admit she's not a cheap woman, has champagne tastes. All those countries on a beer budget can't even touch her. They have to settle for aging actors like Forest Tucker and Joanne Woodward and singers like Coal Porter and Nat King Coal.

She makes me out to be the bad guy. In so many cases it's really Victoria they are fighting over and I'm just doing my job, furthering my career. I've really got my hands full in the Middle East. Those men are really used to women being covered up and buried in the sand. When they discovered her, it revolutionized their way of life. She's taught those terrorists everything they know.

Angela: Did you notice anything else suspicious going on?

Blitz Krieg: Well, I did notice lots of underhanded dealings in Iran and Iraq. They try to keep out of the news, but believe me, the war is heating up. When Victoria Unprincipled is at the root of war there will be lots of trouble. She is so manipulative but tries to disguise herself with an oil surplus and falling prices that won't last much longer.

Angela: Who are you?

Victoria: I'm Victoria Unprincipled. I'm from Dallas, but consider myself a woman of the world. You could find me on location in the Middle East or Venezuela or Indonesia. Men adore me, but I guess that's because I'm one of those unattainable women.

Angela: Where were you at the time of the crime?

Victoria: I was making a new mini-series called, "I''ve Got You Over a Barrel." It won't be released for a few years yet, but let me tell you, it will be just as shocking and filled with power, greed, and money as my first thriller released in 1973, "The Oil Crisis." Of course, I was only a child then and I have had much more time to mature into a real manipulative and political woman. You realize that this is my on-stage character. Actually, I'd like to remain hidden and be left alone. I've been told, though, that I have what people really want. . . and if you've got it, flaunt it. I've always been an advocate of conspicuous consumption.

Angela: Why were you here?

Victoria: I was here only helping Gaia. If I wasn't around people might have considered me a cheap resource. . and we know that's not true. I have never been cheap. I can't understand that Gaia is really gone. I thought that if anyone was to die at a young age it would be me. I've always had a fatalistic feeling that I wouldn't be around many more years. Poor Gaia.

Angela: What do you know about anybody else here?

Victoria: If I were you I'd keep my eye on Captain Ahab. He tries to pawn himself off as a fishing entrepreneur just running his business and trying to help the earth if only she'd let him. He acts as if he's been slighted by the land. Actually, he's in cahoots with industry and urban centers. You won't hear him mention a word about water pollution. He tries to give oil a bad name. All that media coverage for oil spills, but it's only a fraction of ocean pollution. Ahab deliberately allows waste to be dumped in the open ocean beyond territorial limits. He considers himself a global circulatory system and now toxic substances are being detected all over the world. I don't know if it's deliberate or just wanton carelessness on his part. Think of the mercury poisoning at Minamata, Japan, and magnify it for human and marine live. He's got an inflated idea of himself as a gigantic waste treatment works.

Angela: Did you notice anything suspicious going on?

Victoria: His latest escapade is dumping radioactive waste into coastal waters from nuclear reprocessing plants. Lots of local people have gotten sick and died. The man is definitely obsessed. He started with white whales and was a danger to his whole crew. . . now he's definitely a threat to all of us.

Angela: Who are you?

Ahab: Ahab's the name. I run a little fishing business, the Moby Fleet, which has been highly profitable lately. Used to specialize in whales, especially white ones. But I've expanded to seals, cod, and porpoise. Really love this high tech era. I just vacuum the ocean floor for a fish catch. Used to hunt for months for one measly white whale.

Angela: Where were you at the time of the crime?

Ahab: Far away in Antarctic waters trying to settle a dispute between the Russians and the Japanese. They keep competing for Ocean space and they've also discovered oil down there. But they have to realize that the ocean is everybody's property.

Angela: Why are you here now?

Ahab: Believe me, I wasn't interested in killing Gaia. I could have helped her. But NO. She didn't see me as important; all my wealth is submerged. Without me the planet couldn't keep going. In fact, we should call the planet OCEAN instead of Earth because it's 7/10s water. I came here with the best of intentions. If only she would have tried to get to know me she could have benefited from my fisheries, minerals, and ENERGY. I could have made her a real liberated woman!

Angela: What do you know about anyone else?

Ahab: I'd watch out for Remaxima Van Skaak. She thinks it's Century 21 and we have a spare planet parked somewhere in space. I've been getting bad press for years and what do you hear about the deals she puts together. Soil gets washed into the sea every year or carried by the wind and you never hear about it. The woman is full of DIRTY deals. She'd sell you swamp land in Florida if she thought you were gullible enough. Look at some of the real estate deals she's put together—lost land through urbanization, overgrazed the grassland, eroded the top soil. The deserts are expanding, but Remaxima doesn't care. She says these are just "marginal" people anyway. If only Gaia could have seen me for the great resource that I am. The ocean could have given her lots of food.

Angela: Did you notice anything else suspicious going on?

Ahab: As a matter of fact, I did. Old Remaxima was putting some cash crop deals together. She's a real carpet bagger—favors the North all the way. She lets the North grow essential crops like grain while she's convinced the South they can get by producing crops like coffee. When the global economy turns down, the South's farmers are caught between a rock and a hard place.

Angela: Who are you?

Remaxima: I'm Remaxima Van Skaak, highly successful real estate woman.

Angela: Where were you at the time of the crime?

Remaxima: I'm having trouble moving some of my properties, especially forests in Nepal and farmland in the Sahel of Africa. People are beginning to question their value so I decided to take care of this job myself. I was in the Bay of Bengal where millions of tons of topsoil from the deforested slopes of Nepal have washed down to form a new island. Both India and Bangladesh are claiming this new spot of real estate. I wanted to be there first to get in on the deal. Good thing no one is consulting Nepal because it contributed most of the land.

Angela: Why were you on the scene?

Remaxima: Listen, Gaia and I are very close friends. Where would she be without me? Even in our computer, plastic, and concrete age she is closely linked to me. If you don't own land nowadays, how can you have wealth, status, and power? Without land, wood, and food, humanity would die. I came to convince Gaia to support a big agribusiness deal. We could control all the pesticides and chemicals. Just a handful of companies can dominate the processing, manufacturing, and marketing of food. Then we could dominate the farmer and consumer alike. Oh, it would have been a beautiful partnership, but she had to die on me. She was a little worried about the developing countries with overpopulation, hunger, and increasing landlessness. But we were about to close the deal. She knew that soil is marvelous stuff, and we have a Green Revolution going on, a real success story in India. It's the wave of the future.

Angela: What do you know about the others here?

Remaxima: This world was never made for 5 billion people . . . think about the stress Spring Rite is causing. People say I'm not taking care of my property but as our numbers rise and expectations rise, we are demanding more and more from the earth. It's not that I'm making deserts, shrinking forests or degrading soil. It's all the people that are doing this. Spring wants more people but she hasn't been at a global food conference lately. Think of all those children that are getting insufficient protein and dying of starvation. She wants me to provide green for her - a green revolution where there are high-yield varieties of wheat and other grains, but if we just had fewer people I wouldn't have these problems. I'm not a worldwide lawn care organization. Green Revolution gave us some breathing space but she's got to get population under control.

Angela: Did you notice anything suspicious going on?

Remaxima: Yes, I did. Look at the Sahel in Africa: Chad, the Sudan, Ethiopia, Niger, Burkina Faso, and Somalia. I get blamed for the desertification. I'm not trying to sell these people the land. Migrants came there years ago when the Sahel enjoyed better than average rainfall. Then the droughts came and all the publicity started. "We are the world": You bet ya, but the world is land, not just people. Land that had been overcultivated and overgrazed for centuries in the Sahel. Spring Rite has got to realize that the earth cannot support so many people. I'm not going to be the bad guy every time we have a drought or famine!

Angela (turning to Spring Rite): Who are you?

Spring: I call myself Spring Rite, but back in the 60's when the world was really into loving one another I was called Mother Nature. For awhile my popularity lessened, but I'm making a comeback now. My next picture will be "The Numbers Game" but I'm having trouble with the censors. . . they want to give me an X-rating for exponential (cross fingers) growth, but I'm not going to take out any of my lovin'.

Angela: Why were you here?

Spring: I wanted to convince Gaia we needed to do something about those stodgy people in China. Don't you think having only one child (show one finger) is absolutely against nature? This world could be such a loving place and I do love those precious babies. Some people say disease is the result of overpopulation but, really, we could take care of our people if only the world's resources were distributed properly. And some people talk about overpopulation being the cause of unemployment, but that could be easily solved if women returned to the home and took care of the children.

Angela: Where were you at the time of the crime?

Spring: I was on a world tour and happened to be in Latin America meeting with some of my most dedicated supporters. Then I was going to Africa. I still have some staunch supporters there and also in India and China, but they have been led astray lately.

Angela: What do you know about any others here?

Spring: I'm an advocate of a peaceful, loving, world and I wouldn't trust Blitz Krieg. He tries to convince us that we need him to feel secure. But just think, if we spent only 20% less on the military build-up that destroys life, we could spend more on health care that preserves life. Think of the children that die because of lack of food and no health care. There are places where we have wars and we could help those people if we spent the money on them. We can have as many children as we want for we do have the world's resources to support them.

Angela: Have you noticed anything suspicious going on?

Spring: Well, when I was checking on the Afghani children, I dropped into Pakistan and observed a frightening arms build up. Pakistan may soon have nuclear weapons and could be preparing to fight its old enemy India. It's frightening to think that more and more countries have nuclear strike capability and that some nations think they could win a nuclear war.

Angela (turning to audience): You've heard these witnesses accuse each other. Perhaps you should ask them some questions.

[See "Sample questions to plant in audience"]

Angela (to audience after brief question period): Take five minutes with your group to deliberate.

Then, choose a spokesperson to give us your group's choice: Who is guilty of murdering Gaia and why? Here's a copy of my report.

(Angela passes out copies of her "Official Report" and after 5 minutes calls for group oral reports. After the reports she turns to the witnesses).

Angela (to the witnesses): You've heard what they think. Who is right?

Ahab: It seems that any of us could have killed Gaia. But this is not the case—only one of us in fact caused her death. I could have poisoned her by polluting the oceans and destroying the inhabitants. I felt misunderstood by the earth, Gaia, but was innocent in my intention. The poison that was slowly creeping into her system was the result of improving the living standards of her people.

Victoria: I had a really classy plan to kill Gaia. I got her addicted and dependent on the drug I offered her and was planning an overdose to make it look like suicide. I had tried once before, in 1973. She was nearly unconscious but woke up just in time . She realized I couldn't be trusted so it was an unworkable idea.

Remaxima: I could have killed Gaia through exposure: I stripped her of her topsoil, which is her nourishment, and her forest cover and millions of acres of grassland. Gaia was catching on to my embezzling schemes and was going to take revenge for the property that I was selling for a quick profit. I have a lot of underworld connections that could have furthered my career and Gaia had discovered all of this. I had to get rid of her but wasn't quick enough.

Spring: Oh, I am sorry. I must admit I was trying to kill Gaia by slow starvation and malnutrition, but it was too slow a death and so untidy. Oh, I'm so sorry. . .

Blitz Krieg: I am the culprit. Gaia was beginning to be suspicious of all the enemies she had and it wouldn't have been long before she saw the handwriting on the wall. So I had to act quickly. The others would have killed her eventually and they all had strong motives. But Gaia was going to expose me as a terrorist-assassin. But I'm the one that could act the quickest before solutions could be found for the earth's problems. I nuked her in the dark and shot her when she glowed with radiation that was the equivalent of one million Hiroshimas. Lucky for her she died quickly, because, if she didn't, she would have died from slow starvation in a nuclear winter.

Angela (to audience): I don't know about you, but I'm charging them all for the murder of Gaia!

CURTAIN

"How To Murder Your Host"
Sample Questions to Plant in the Audience

For Herr Blitz Krieg:

Did I hear you say that the arms build up poses no threat to world survival? Can I believe my ears?

For Victoria:

You keep accusing Captain Ahab. What in the world do white whales have to do with Gaia's death? Guilt by association?

For Ahab:

You keep accusing Remaxima of ruining the land, and killing Gaia, and you claim the ocean is more important than the land. Then your actions are inconsistent. How can you justify the pollution of ocean resources?

For Remaxima:

Ahab accused you of not worrying about the people of the Sahel—that they are marginal people living on the edges of the desert. Is that an accurate quote? What do you mean by that?

For Spring Rite:

It may be useless to ask you for a logical answer. Doesn't it seem to you that if there was enough land for people to feed themselves in India then they wouldn't be warring with neighbors to get more land. Isn't it overpopulation and the resulting desire for more land that causes wars? Isn't it your fault Gaia is dead?

Official Report of Private Detective Angela Landscape

Offense/Incident: Murder of Gaia

Discovered By: Victoria Unprincipled

Apparent Cause of Death: Awaiting autopsy report.

Circumstances Leading to Death:

Chemical analysis in progress; lesions on body unexplained.

Suspects: Five (5) suspects at scene: Captain Ahab, Herr Blitz Krieg, Remaxima Van Skaak, Victoria Unprincipled, and Spring Rite.

Summary of Facts on State of the Earth

A. Land Crisis
  1. Degraded the forests
  2. Overgrazed the grassland
  3. Soil lost through urban development
  4. Eroded topsoil
  5. Advance of desert

B. Ocean Crisis:
  1. Declining fish stock
  2. Marine pollution
  3. Destruction of marine habitats, especially along coast zones
  4. Near extinction for most large whales

C. Oil Crisis:
  1. Increasingly short supply
  2. Known reserves-depletion of known reserves in about thirty years

D. Overpopulation:
  1. Doubling of world population in thirty years
  2. Resulting famine
  3. Resulting disease
  4. Resulting infant mortality
  5. Resulting unemployment

E. War:
  1. Increasing violence, terrorism and political unrest

2. Over 160 armed conflicts—most in developing countries
3. Most of the wars in developing countries real root lies in basic resource problems, reflecting inequalities in resource distribution within and between boundaries
4. Even though wars seem to be local affairs, there tends to be super-power involvement
5. Nuclear arsenals contain combined potential firepower of over one million Hiroshimas.

WATER USE AND AVAILABILITY - A CASE STUDY OF COLORADO SPRINGS

SENIORHIGH

The physical, political and economic aspects of water in the West are set in a decision-making classroom unit.

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> "Water has the peculiar quality of being an inexhaustible natural resource which is nevertheless in short supply."
> R.F. Dasmann

The above quotation deserves emphasis in the arid and semi-arid areas of the western United States. This region is growing in population and economic power, and its demand for water is increasing for industrial, recreational, and domestic uses. The problem of future water availability becomes obvious when one realizes that water is in short and limited supply and that the easily exploited sources of water are now essentially gone.

Difficult questions must be asked and answered. How can cities keep growing when water is strictly limited? How can we preserve our cherished natural environment while extracting water at ever increasing rates from natural areas? What rate structures should be used to guarantee the rational use of water by people? What techniques can we use to ensure reliable water sources for the next decades and centuries? These and other questions must be addressed by public officials, business interests, and especially by private individuals who vote both through the ballot box and the pocket book. It is critical that the future citizens of western states understand not only the physical aspects of water but also the political and economic aspects. This curriculum unit is designed to begin this educational imperative.

Since Colorado Springs is typical of urban areas in the West, data on Colorado Spring's water supply and use problems are used to put this unit into a realistic context. Nevertheless, the unit can serve as a model to be used in almost any area where water is a critical commodity. These lesson plans that deal with Colorado can easily be modified for other areas. The scenario will help the students clarify their environmental and civic values, develop priorities based on facts and political possibilities, and emphasize the idea that there are no totally right or wrong answers to the difficult questions stated above. The scenario is designed to stress the process of decision making, and the data provided are not necessarily accurate.

Model Lesson Plans

The following lesson plans for this unit of study will take from 5 to 7 days depending on the length of class time, number of students, and grade level and/or ability grouping. This model is based on surface water; it may have to be changed for those areas where surface water is either not available or is used in conjunction with well or ground water.

Day #1: Using a container of water, have students identify the physical and chemical properties of the substance in the container.

Where does water come from? Lead into a discussion of the hydrologic cycle with illustration on board. In writing, identify where water comes from in your community. Be as specific as possible with names and locations. Students share information/ideas (This is a good opportunity to discuss local/regional geographic understanding and history). Ask students to list in writing who or what uses water in their community. Encourage them to work from the general to the specific...in categories. Identify and list these categories on the board.

Day #2: Pass out blank maps of the river systems for your state/region and show with transparency the rainfall pattern of the area. Students draw in isohyets. Discuss the amount of rainfall and possible locations of community water sources based on this information. Students draw boundaries for what they consider to be the drainage basins for the region. Show actual drainage patterns with transparency. Relate drainage system to community water sources. Are they compatible with natural patterns of water flow? Why or why not? Once water reaches the community to whom is it distributed? Refer to the first day's notes and add any additional information.

Day #3: Ask students to identify which water consumers use the most in a year's time, the second most, and so forth. Develop a class consensus and rank them on the board. Discuss why the class ranked the water users the way they did. What ways may the ranking change in the future? Also, what influences and conditions determine who gets what of a limited resource such as water? Introduce the simulation, "Water Availability and the Consumer: The Decision Making Process"

Water Availability and the Consumer: Simulating The Decision Making Process

Rationale

Water is a limited resource and, therefore, its availability and use are controlled by a variety of factors. This simulation will challenge students to act in various decision making roles as they determine how this resource will be distributed over a 5-year period based upon available data. (The decisions reached may not be final in any given time period as both the availability and the amount of water used may change.)

Objective

Participants are to present their respective views in order to convince the final decision making body — county commissioners, city council, or regional water board — as to how water resources will be allocated for a prescribed period of time.

Participants

(Roles may vary depending on local conditions; the final decision in this model will be made by the city council)

mayor (1) - conducts hearing but has no vote unless it is a tie
city council (7) - hears arguments and makes final decision
chamber of commerce (2) - encourages business growth and is supportive of residential increase developers - commercial (3); projects 15% water increase in 5 year period
residential (3); 20% increase in water use in 5 year educational (1); 5% increase in water use in next 5 years parks/recreation (1) - wants expansion of parks, development of new parks and green belts; 20% water increase in next 5 years environmentalists/conservationists (2) - concern over reduction of water in source areas; want 10% reduction in community over 5 years water treatment (1) - concern over the existing capacity of treatment plants which are operating at 80% capability. No new construction in next 7 years
military (1) - increase in medical and recreational facilities for retirees; 1% increase of water use in next 5 years
concerned community members (?) - persons who have an interest in the community.

Conducting the simulation

Give each group copies of the data sheets (Tables 1-5). Using this information, try to convince the city council to allocate water supplies according to their particular needs over the next five years. At the conclusion of oral discussion and debate, the city council votes on how much water each group will receive for the next five years. Their reasons will be prepared in writing as a matter of record. (Note: There is no appeal process permitted in this exercise).

Additional factors to consider as a challenge:

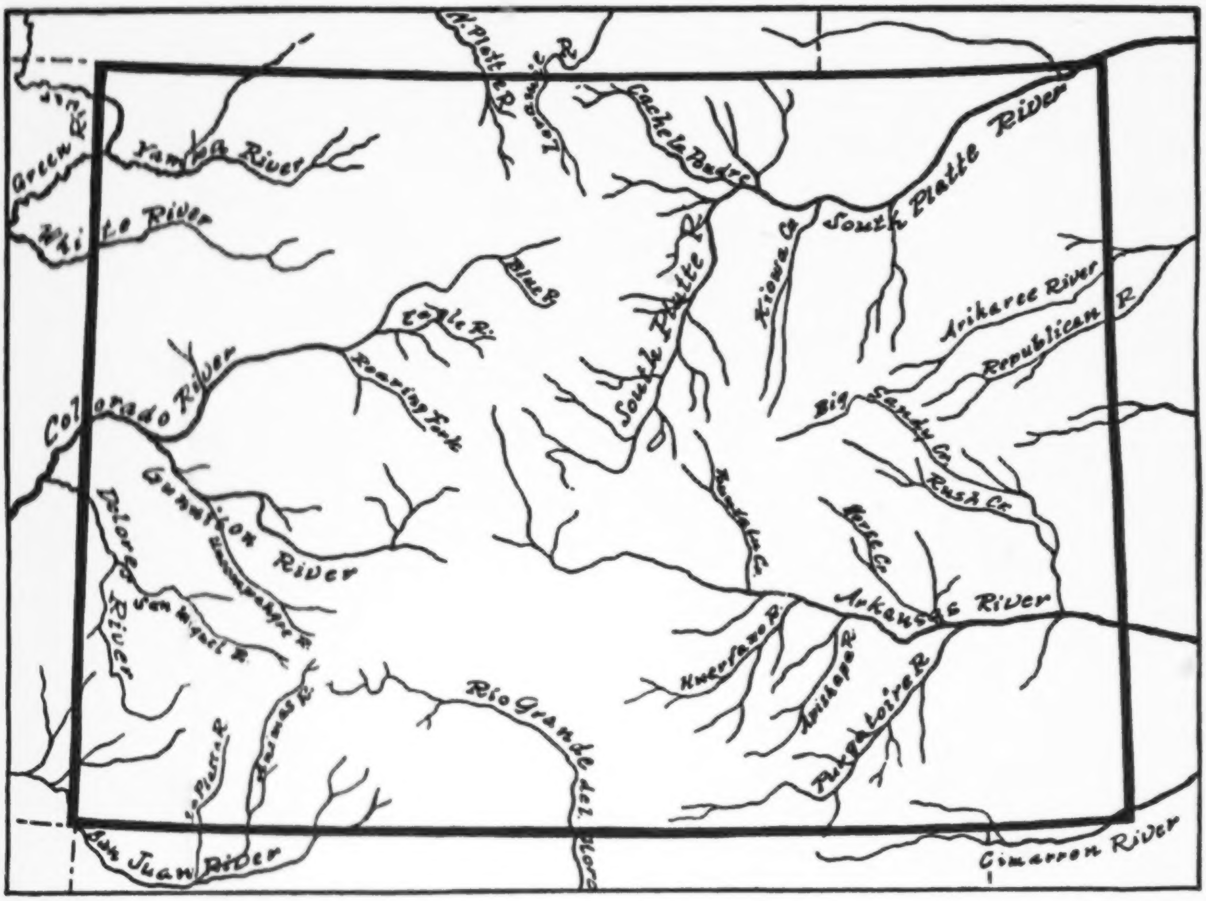
A. During the course of the simulation it could be announced that the federal government plans to reactivate the oil shale operations on the western slope and thus will draw upon the same water resources as used by the city. It is anticipated that the oil shale operation will reduce by 8% the total amount of water available to the city.

B. It has come to the attention of the city council that one of the diversion tunnels that carries water through the mountains has collapsed due to shifting ground and the water supply will be reduced by 25% while repairs are being made which will take a minimum of three years to complete.

C. The neighboring city of Angora has decided to purchase a large percentage of its water from another source thereby making available to your city approximately 10 mgd. There is no time limit to its availability.

Evaluation

Students will be evaluated by the teacher on the basis of their classroom participation, i.e., oral/written arguments and their ability to use maps and statistical data to support their views. Also, students will be expected to correctly define relevant terms used in this study.


N. Platte R.
Laramie R.
Cache la Poudre
South Platte River
Green R.
Yampa River
White River
Blue R.
Eagle R.
South Platte R.
Kiowa Cr.
Arikaree River
Republican R.
Colorado River
Roaring Fork
Big Sandy Cr.
Rush Cr.
Fountain Cr.
Horse Cr.
Gunnison River
Dolores River
Uncompahgre R.
San Miguel R.
Arkansas River
Huerfano R.
Apishapa R.
Purgatoire R.
Rio Grande del Norte
La Plata R.
Animas R.
San Juan River
Cimarron River

RIVERS OF COLORADO

Table 1. Glossary of Terms

acre foot = amount of water that covers one acre of land to a depth of 1 foot. (325,851 gallons)

potable = fit for human consumption

mgd or MGD = million gallons per day

AF/YR = acre feet per year

gpd = gallons per day

gpcd = gallons per capita per day

AAD = annual average day (Annual average day use is the yearly total water use divided by the number of days in the year)

MD = maximum day (Maximum day use is the maximum quantity of water used on any day of the year)

MH = maximum hour (Maximum hour use is the maximum use rate of water during any one hour of the day)

Table 2. Developed Water Supply Sources

Supply Source	Average Annual Supply	
	acre-feet	mgd
Mikes Peak	13,900	12.40
Southfield	600	00.53
Pink River Project	12,100	10.79
Tentstake Project - Phase I	12,900	11.51
North Urban	2,500	2.23
Deadpan - Kansas Project	14,400	12.85
Triplet Lakes Project	24,600	21.94
South Fork Ranch	1,400	1.25
Total	82,400	73.50

Table 3. Historical Water Use

Year	AAD mgd	MD mgd	MH mgd	Ratio MD/AAD	Ratio MH/AAD
1980 (0)	50.9	119.1	191.0	2.3	3.8
1981 (1)	48.4	114.2	158.4	2.4	3.3
1982 (2)	48.6	123.6	192.0	2.5	4.0
1983 (3)	52.4	135.4*	205.5*	2.6	3.9
1984 (4)	55.4	128.1	192.2	2.3	3.5

*Voluntary odd-even day program

Note: It is estimated that the present split between residential and Industrial-Commercial-Institutional (ICI) uses is about 60/40 in this community.

Table 4. Metered Water Sales

Year	Residential mgd	Commercial mgd	Military mgd	Parks mgd	Total mgd
1980 (0)	19.97	17.01	6.67	7.28	50.93
1981 (1)	19.19	17.27	6.10	5.82	48.38
1982 (2)	17.49	17.16	5.76	8.19	48.60
1983 (3)	20.58	18.79	6.10	6.79	52.26
1984 (4)	na	na	na	na	55.40

Table 5. Treatment Plant Facilities

Source		Capacities Design	Overload
	mgd	mgd	
Southfield	16	20	
Oak Valley	42	63	
Butte	30	36	
Narrowmoor	2	2	
Mountain Valley	12.85	12.85	
South Fork Ranch Wells*		1.25 1.25	
Total	104.1	135.1	

* No treatment except disinfection

Note: Potable water enters the community distribution system from four water treatment plants and from the South Fork Ranch wells. A fifth treatment plant (Mountain Valley) is operating on a part time basis for testing purposes but is not expected to add significantly to the total treatment capacity for another three years.

Bibliography: Water Resources

National:

U.S. Geological Survey
Water Resources Division
Building 24, Denver Federal Center
Denver, CO 80225

State:

Colorado Water Conservation Board
Division of Water Resources
1845 Sherman Street
Denver, CO 80203

County:

Area council of governments
(Pikes Peak Area Council of Governments
27 East Vermijo
Colorado Springs, CO 80901)

County water offices may provide water resources circular prepared by the Colorado Water Conservation Board

City:

Black and Veatch, Comprehensive Report on Water Works Facilities for Colorado Springs, Colorado, Kansas City, MO, 1984

Report on Water Supply and Availability, Colorado Springs, Colorado, Water Division Resources and City Planning Department, July 1983

Selected Works/Contributors:

Clapp, Joy and Paul C. Stevens, Geography of Colorado, Boulder, Colorado: The Old West Text Books, 1977

Colorado Energy and Resource Educators, 330 Prospect Mountain Court, Moraine Route, Estes Park, CO 80517 (Provides workshops and materials on a variety of environmental themes, e.g. "Water issues for Colorado's Future")

LOCAL ELECTORAL GEOGRAPHY

SENIORHIGH

Lessons in politics and voting behavior make good vehicles for teaching geographic concepts of distribution and areal association. Because voting results can most effectively be portrayed on maps, our visually oriented students receive strong impressions of the correlations between election results and socioeconomic patterns.

Election results and political conflict may also mirror a change in community as the mobile American population shifts south and westward. A role-playing exercise in political opinion-making is included to illustrate the dynamic aspect of local politics. The simulation is based on Douglas County, 25 south of Denver, Colorado, but the format can be adapted to other locations and other conflicts.

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Objectives

The student will:

1. learn the meanings of precinct, socioeconomic, areal association, distribution, pattern, annexation;
2. map voting results and explain the pattern observed;
3. write a paragraph explaining the areal association between election results and one socioeconomic characteristic;
4. read and contrast population pyramids;
5. read to find fact and opinion and present arguments orally.

Time 2 - 3 days of class

Materials

Gather your own community's election results and precinct maps in the Planning and Zoning departments. I used the Colorado Index to 1980 Census Maps for SMSA Denver-Boulder.

Copies of back newspapers are usually available at cost from the newspaper office.

Information packets for 4 or 5 groups.

Role cards and name tags for 5 groups and reporter.

Lesson Outline

Day 1:

1. Introduce the most exciting and hotly contested election in your locality in the past year, e.g., school board, tax or bond issue, constitutional amendment, recall election, city-county-state-national officials. Use headlines cut or reprinted from newspapers. Explain how votes are counted and recorded by precinct or district.
2. Pass out election statistics and maps. Have students work

in pairs to shade in precincts where candidate or issue won (or lost if that was a more surprising result). One student may read precinct numbers; one will shade in the map.
(Is this worth the time? Yes, with slow learners who will find it a challenge to read the statistics, determine the winner, and find the precinct. Yes, if your class needs a "calming" activity. No, if time is short, so do just a sample number of precincts in a region where you've noted a sharp division of results. Then present the whole map you have made on a transparency.)
3. Orally or in a written paragraph, have students describe the geographical voting pattern and suggest reasons to explain it.
4. Explain the census collection of socioeconomic information. For 1 to 3 characteristics, contrast prepared overlay maps with matching transparency maps of voting results. Have students record their observations. Discuss noted correlations or lack of them and possible explanations. Discuss the value of this kind of information to candidates running for office.

Day 2: (or as a separate lesson)
1. Discuss the effects of growth or decline in population on political patterns by describing an area and by projecting maps showing population change (i.e., precinct maps) and population pyramids showing growth, decline, or shift in age groups over a decade. (If your students are unfamiliar with population pyramids, try the exercise on Chicago population in MacMillian's HSGP Cities unit.)
2. Has in/out migration affected voting behavior? Project election maps for 2 votes on state or national level. Note whether the pattern changed or remained constant. Discuss explanations for pattern over time.
3. Has in/out migration affected political behavior in other ways? Introduce and give background on conflict situation. Have class suggest the identities of opposing interest groups.
4. Break class up into 4 or 5 groups assigning each an identity role card and information packet. Allow 15 minutes for members to read and note facts and opinions that will support their viewpoint. (Or, do this as homework and continue the simulation next day.)
5. Announce that a radio roving reporter is present to interview representatives of each political faction. Explain that they will thus have a chance to influence the votes of the community. Each group should then choose a spokesperson (who will wear the name tag) and will have 5 minutes to brief their speaker.
6. Reporter conducts interviews in front of class for 15 minutes.
7. Ask for a vote: Do the citizens of ______________ approve or disapprove of ______________?
8. Students are then asked to briefly summarize the positions and justifications of each of the groups.
9. This activity can be extended by mapping general election results that pertain to the conflict or the voting pattern of a city council or boards.

Ask: What does location have to do with the voting decisions? What socioeconomic factors may have influenced the voting?

ROLE CARD: Resident of Aurora

You've been taken by surprise at the request for annexation made by realtors and large landowners from Douglas County. Their request for quick action makes it difficult to fairly weigh their offer of developer-funded services, water rights, and increased tax base against the potential problems resulting from the addition of a land parcel 1/2 the size of present Aurora.

ROLE CARD: Old Castle Rock Resident

You voted for Commissioners Susy McDanal and Clark Huff just to keep this kind of change from coming to Douglas County. You've felt increasingly pushed around the last ten years as Douglas County has changed from rural backwater to bedroom suburb, bringing more houses, more people, more traffic, and more taxes.

ROLE CARD: Real Estate Developer

Fed up with the Douglas County Commissioners policy of restrained growth and what you see as lack of services, political instability and infighting, and inefficient and fragmented administration you have joined together to ask for annexation to the city of Aurora.

ROLE CARD: Small businessman in Castle Rock

You are a minority among the working population of Douglas County, most of whom commute to Denver and suburban office parks each day. It's already hard enough to make a living competing with Denver and Littleton without seeing more customers and tax base lost to Aurora.

ROLE CARD: Yuppie Newcomer to Douglas County

When you visualize Aurora you see wall-to-wall houses crowded along polluted highways. You moved to your 5 acre "ranch" near Parker just to get away from city life.

ROLE CARD: Radio reporter

You are interviewing residents of Douglas County and Aurora for Castle Rock's jazz station, KADX. Included on the list of questions you've prepared are:

1. Why did the developers make such an extreme move?
2. Is there any truth in their charges against Douglas County's government?
3. How does the ordinary citizen react to the proposal?
4. What do the commissioners plan to do about the challenge?

MIGRATION AND THE WEST: THE INTERNATIONAL CONNECTION

SENIOR HIGH

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Given the following scenario, have the students simulate the decision-making process of migrants to the U.S. In addition, have them compare and contrast the unique factors of each group's migration including physical characteristics of the source area, "push" and "pull" factors, and expectations at destinations.

Prior to this activity, use references and background information to teach a short history and geography lesson on Cambodia and Mexico. Then conduct a discussion of immigration, giving definitions and reasons for immigration. Note that there may be several steps in immigration; also note the problems upon arrival in U.S.

Closure will consist of feedback from groups with discussion.

The People's Republic of Kampuchea, formerly called Cambodia, occupies part of the Indochinese peninsula in Southeast Asia. It is bordered by Thailand and Laos to the north, Viet Nam to the east, and the Gulf of Thailand to the south. The climate is tropical and humid. There is a rainy season from June to November, with the heaviest rainfall in September. The temperature is generally between 68 degrees Fand 97 degrees F. The official language is Khmer, which is spoken by all except the Vietnamese and Chinese minorities. The principal religion is Theravado Buddhism.

Background Information: Cambodia (Kampuchea)

Area: 69,898 square miles
Population: 7,200,000 (estimated)
Capital: Phnom Penh (pop. est. 600,000)
Employment Profile:
- Agriculture, Forestry, Fishing - 78%
- Manufacturing - 4%
- Other - 18%

Arable Land per capita: .8 acres
Life Expectancy: 48 years
Median Age: 18.5 years

Mexico

Area: 756,066 square miles
Population: 78,524,000
Capital: Mexico City (pop. 9,191,295)
Employment Profile:
- Agriculture, Forestry, Fishing - 26%
- Manufacturing - 13%
- Transportation and Communication - 5%
- Construction - 10%
- Other - 46%

Arable Land per capita: .89 acres
Life Expectancy: 66 years
Median Age: 17.1 years

MIGRATION AND THE WEST: THE INTERNATIONAL CONNECTION

SENIOR HIGH

The United Mexican States is the largest country in Middle America. It is bordered on the north by the United States and on the south by Guatemala and Belize. The Gulf of Mexico and the Caribbean Sea lie to the east, and the Pacific Ocean and Gulf of California to the west. The climate varies with altitude. The tropical southern region and the coastal lowlands are hot and wet. The highlands of the central plateau have a temperate climate. Much of the north and west is arid desert. The principal language is Spanish, spoken by about 90% of the population, while about 8% speak indigenous languages. About 96% of Mexico's inhabitants are Roman Catholics.

Migration Group Activity

This is a decision-making exercise for studying human movement and settlement processes. It can follow a teacher's introduction in a single class period or it can extend over several days and require independent study by the students using the bibliography provided.

Divide the class into two groups (preferably 10-12 maximum per group). Give one group the Cambodian and one the Mexican scenario. After each group presents its report, the class can then discuss the two situations and the similarities and differences in the decisions. A comparison chart can be made identifying the similarities and differences.

Materials atlases/maps; appropriate references

This activity deals with the geography themes of Location, Place, and Movement. It uses the geographic skills of asking geographic questions, acquiring geographic information (map use, statistical data), presenting geographic information (oral and/or written reports, maps), and development of geographic generalizations

Scenario: The Kamput Family, Cambodia

The Kamput family has been farming for several generations in southwestern Cambodia. They are landowners and usually manage to support the entire family, however meagerly. Mr. Kamput attended school for 11 years and is a literate man who is highly respected by the village. He is often called upon to help with village decisions. He has a nephew living in New York City. The Khmer Rouge have just taken over Phnon Penh and rumors are circulating that the Khmer have been executing members of the "corrupt upper class." The family is in grave danger.

Decisions to be Made

Why is your family threatened? (Define the problem.)

Where will you go? How will you get there?

What method of transportation will you use? What geographical barriers will you cross? What do you think the trip will be like?

When you reach the refugee camp, what type of appeal will you make to the authorities? (priority, destination, why, etc.)

Assuming that you reach your destination safely, what problems might you have at this location? Why?

Note: Be prepared to have one member of your group give a report to the class.

Scenario: The Diaz Family, Mexico

The Diaz family farmed a small plot of land in the hills of the state of Sinaloa. They grew melons, potatoes, and groundnuts, but only made about $200 per year. They moved to the city of Guadalajara, in the state of Jalisco, with hopes for more income and better schools for the children. But Señor Diaz is unskilled and has trouble finding work, the family was robbed, and the children are ridiculed by the city kids at school. Life has not improved and news of a better life in the United States reaches the Diaz family from Señor Diaz's brother in Denver and Señora Diaz's cousin, who works on a farm north of Denver.

Decisions to be Made

Why is it so difficult for your family to get ahead in Mexico? (Define the problem.)
Where is your family likely to go now? How will you get there?
What method of transportation will you use? What geographical barriers will be encountered? What do you think the trip will be like?
What other types of problems are likely to be encountered in making this trip?
Assuming that you reach your destination safely, what problems might you have at the new location? Why?
Note: Be prepared to have one member of your group give a report to the class.

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Time (entire issue). July 8, 1985, v. 126.

Teachers Background Information: From Refugees International, Fall, 1986

In the past decade, perhaps 15 million persons have been driven into exile by war, persecution, and natural disaster. Most well-known in the United States is the plight of the two million persons who have fled the countries of Indochina- Cambodia, Laos, and Vietnam, since the upheavals there ten years ago. The Communist revolutions of 1975 ended more than two decades of U.S. military involvement in Indochina. Since then, 800,000 refugees from Cambodia, Laos and Vietnam have found safe haven and new life in the U.S.A. Large numbers of Indochinese have also been settled in China, Canada, France, and Australia, and many other countries have maintained smaller but significant resettlement programs. In the past eleven years more than one and one-half million Indochinese have been able to rebuild their shattered lives through "third-country" resettlement.

With the fall of the U.S.-backed government in Cambodia in April, 1975, Pol Pot's Khmer Rouge forces began a brutal four-year reign of death and terror. Conservative estimates are that at least one million Khmer (ethnic Cambodians) died during Khmer Rouge rule; some estimates run above three million, about half the country's population at that time.

Internal dissent and war with Vietnam led to the collapse of the Pol Pot regime in early 1979; Cambodia's western border broke open, and tens of thousands of famine-stricken Khmer fled into Thailand. By mid-1980, a half-million Khmer were living in refugee camps in Thailand or along the Thai border.

Massive international relief and six years of resettlement processing have reduced this population by about half (the U.S. has resettled about 140,000). But 250,000 Khmer remain stranded in border camps. They are not recognized as "refugees" by the Thai government and they are denied resettlement and the protection of the United Nations High Commission for Refugees (UNHCR). An additional 25,000 refugees are interned in Thailand's Khao-I-Dang camp, but Thai authorities have threatened to relocate them to the contested border zone.

Problems with Immigration

A. Federal and international rules:

B. Conservative mood:

C. Smaller quotas:

D. Waiting for years:

E. 40 regions of conflict:

F. Dangerous Camps:

G. Alternatives cost $$$ AND are also dangerous

AND THEN...... ONCE HE/SHE ARRIVES IN THE U.S....

—What cultural problems would he/she experience?

IMMIGRATION PROCESS
(NOTES)

CAMBODIAN

Legal	Illegal

MEXICAN

Legal	Illegal

THE LOCATION OF NUCLEAR WASTE: AN INTRODUCTION

SENIORHIGH

The views expressed here are solely those of the author and not those of the Western Interstate Energy Board.

Gerald Jacob
Western Interstate Energy Board

Conflict and the location of controversial facilities are common topics in the literature of political geography. Public opposition, or support for a particular facility and location suggest that political and economic factors must be considered if we are to understand the forces that shape and alter a landscape. The siting of a hazardous facility cannot be reduced to a simple matter of applying objective, geophysical criteria. The risks and uncertainties inherent in the operation of a complex industrial facility raise serious questions about that technology and the political-economic system that promotes it. The answers to these questions are fought over in any attempt to site a facility as potentially hazardous as a nuclear waste repository.

Highly radioactive waste in the form of spent fuel rods is a particularly hazardous by-product of nuclear generated electricity. A reactor's fuel consists of pencil-thin pellets of enriched uranium contained within long rods. Bundles of fuel rods, inserted into the reactor core, initiate a chain reaction, producing the heat that drives the generators. Eventually the fuel becomes polluted with by-products of the fission process and an efficient reaction can no longer be maintained. Thus spent fuel rods have to be replaced periodically. Assemblies of spent fuel rods are currently stored at over 100 commercial reactors in the U.S.—the majority located east of the Mississippi River. (This does not include military, research, and experimental reactors that also produce high-level waste.) Spent fuel rods remain highly radioactive and continue to produce heat for years after discharge from the reactor. Current environmental standards require that spent fuel rods be isolated from the biosphere for thousand of years.

Attempts to reprocess commercial spent fuel rods do reclaim uranium and by-products, such as plutonium, have never been commercially successful in this country. Some European governments support a fuel reprocessing industry. But many oppose this "solution" because it increases the supply of plutonium that can be used in manufacturing nuclear weapons. In any case, recycling still leaves behind high-level waste, much of it in liquid form, which creates another, particularly difficult disposal problem.

Whatever their destination, spent fuel rods from commercial reactors must be transported in heavily shielded casks, certified by the Nuclear Regulatory Commission. However, the adequacy of these casks has been questioned, making the transport of this cargo on highways and railroads highly controversial.

In the U.S., permanent disposal of spent fuel rods in an underground repository has long been supported as a way to get rid of the undesirable by-products of nuclear generated electricity. A repository is essentially a deep underground mine with the usual contingent of shafts, drifts, and rooms. Waste is received at a surface facility, removed from the transport cask, put into another container, and hauled into the repository where it is placed in a room mined out of rock. Waste containers cannot be placed too close together because they generate heat that may affect the local geology. After a room reaches its quota of canisters, it is backfilled with rock and sealed. In theory, waste buried in a stable geologic medium will remain isolated from groundwater and the biosphere for thousands of years. A location with faults, fractures, tectonic or volcanic activity, proximity to an aquifer, past drilling activity, or the potential for future drilling activity, may be unsuitable for a repository because such features could jeopardize isolation. In the past, various geologic formations have been considered for repositories. More research has been completed on salt and granite but other types of rock, such as volcanic tuff and basalt, have also been considered.

Initially, the process for selecting a repository site was left to the discretion of energy agency administrators. But after years of unsuccessful attempts, and with nuclear utilities demanding relief from accumulating inventories of spent fuel, Congress formalized the site selection process. The 1982 Nuclear Waste Policy Act spelled out the major criteria and process to be used for selecting two repository sites—one in the West, and later one in the eastern U.S. Within a few months after passage of the Act, the Department of Energy (DOE) identified nine "potentially acceptable sites" in Washington, Nevada, Utah, Texas, Mississippi, and Louisiana. Eventually, sites in Texas, Washington, and Nevada were selected for additional, intensive study known as "site characterization." Site characterization studies would require constructing mine shafts to access the geologic formation being considered for the repository. Only after years of characterization studies could one of the three sites be recommended for a repository. Funding for the lengthy repository program comes from a tax on nuclear generated electricity.

Opposition to the DOE program was intense and progress slow. The credibility of DOE science and the agency's commitment to environmental protection was often maligned. Criticism intensified when, in an election year, DOE decided to defer consideration of sites for a second, eastern repository. In 1987, Congress intervened. DOE was ordered to end all studies at the Washington and Texas sites and concentrate instead on Yucca Mountain, Nevada. The State of Nevada continues to argue that Yucca Mountain (adjacent to the Nevada Test Site) has geologic conditions that make it unsuitable for a repository. It is unclear what will happen if that indeed proves to be the case.

The first U.S. repository, currently planned for Yucca Mountain Nevada, will have a design life of less than thirty years. However, the political infeasibility of siting a second repository means this location may receive all the high-level waste generated by the U.S. in the foreseeable future. In addition, President Reagan decided that a repository for commercial spent fuel may also be used for high-level waste produced by weapons programs.

Much controversy has surrounded the selection of a site for a high-level nuclear waste repository. The issue has moved beyond the site-specific to one of regional and national significance. Other facilities, such as low-level radioactive waste and chemical waste dumps, may prompt similarly intense and widespread opposition. The technical details may change, but many of the same issues, public concerns, and political dynamics will be present. Although based on the Texas repository site, the classroom simulation by Fleta Nockels that follows can be used to capture general features found in any conflict involving the location of a potentially hazardous facility.

SITING A NUCLEAR WASTE FACILITY

SENIORHIGH

With the passage of the Nuclear Waste Policy Act in 1982, location of high level nuclear waste dumps in the United States became a major issue of the 1980's. This simulation activity for secondary students attempts to draw their attention to the issues that should be discussed before a waste facility is located. Although the details of the exercise are based on a specific site in Deaf Smith County, Texas, the factual information is less important than the development of questions pertinent to the problem.

Fleta W. Nockels
Douglas County High School
Colorado

Objective

The students will examine implications of a waste disposal site choice and develop and analyze their questioning skills

Time Two class periods

Materials

The student "experts" may refer to Environmental Assessment Overview: Deaf Smith County Site, Texas, U.S. Department of Energy, Office of Civilian Radioactive Waste Management, May, 1986, #DOE/RW - 0075, available free as long as copies last from the U.S. Dept. of Energy, attn: EA, 1000 Independence Ave., S.W., Washington, D.C., 20585 or from National Technical Information Service, U.S. Department Of Commerce, Springfield, VA, 22161, price code AO3.

Role cards and optional name tags
Summary worksheets

Lesson Outline

Previous Day

Assign 4 roles (Canfield, Williams, Peterson, Leeds) as homework readings (for extra credit?).

Day 1

1. With Canfield, Williams, Peterson, and Leeds seated at table in front of room, introduce activity, explaining the value of citizen questioning of public policy and government decision making in a democratic society. Stress the importance of geographic questions regarding location and its effect locally, nationally, and globally. Then step back and let the "experts" take over.

2. Pass out role cards (and optional name tags).* Explain if necessary that some roles contain background information that the player may wish to use later in group meetings. Oversee introductions.

*There are 19 roles (plus the League president and 3 experts). Some roles may be handled by more than one student, e.g., 9a the Nuclear Waste Forum representative.

3. Assist students in breaking into groups according to the color of the role card. ("Margaret Canfield" should join the appropriate group. The "experts" can use the time to prepare for Day 2.)

4. Remind students of their task: What questions

should be asked before a waste site is chosen? What important issues should be brought up as indicated by their assumed role? How can their questions be stated to force an honest and informative answer from the experts?

5. At the end of 10 minutes collect sheets on which questions have been written by each group. Explain that the experts will read the questions and prepare answers to be given the following day.

6. Meet with the experts to select questions for which they, you, or a visiting speaker can find answers.

Day 2

1. With question sheets posted around the room, recap the simulated events of the previous day. The experts may then read and answer one question from each group's list, successively for 15 minutes. (If the experts threaten to be long-winded, appoint a timekeeper.)

2. Ask for a straw vote: Now that you've asked the questions, what would be your recommendation: for or against a nuclear waste repository in Deaf County?

3. Discuss with the class the questions they asked and the kind of answers they got. What wasn't asked that should be considered? What additional information or background did they need in order to ask good questions?

4. Pass out review sheet and discuss after time needed to fill it in.

5. (Optional) Extend the lesson by class research on:
   - a. effects of siting of nuclear facilities at different scales from local to international.
   - b. non-nuclear waste disposal location
   - c. problems of evacuation in case of nuclear accident.

Note: To get ideas on this subject, refer to the activity entitled "Denver Disaster: Relocation of Forced Movers"

Siting a Nuclear Waste Facility Worksheet

Your name: ____________________________

Your role: ____________________________

1. Write down what you considered were the 2 best questions asked:

2. Explain WHY you chose these as "good" questions.

3. What were the 2 poorest questions?

4. WHY do you think these are "poor" questions?

5. Rewrite each of the "poor" questions below so that important issues will be brought out in the answer:

6. How did your role description suggest good questions to you?

7. How could the role information be changed to help you more?

ROLE CARD: Margaret Canfield, President, Amarillo, Texas, League of Women Voters

You are president of a group concerned with public policy issues. The news of the potential choice of neighboring Deaf Smith county as the site of a major nuclear waste dump has caused concern among many citizens in Amarillo and in smaller communities nearer the site. Therefore, you are hosting a meeting open to the public at which 3 scientific experts will present information and answer questions.

Your opening remarks:

Welcome ladies and gentlemen to what is, I believe, the first opportunity for people in the locality of the Deaf Smith County site proposed as a nuclear waste repository to find out what is happening and to ask some important questions.

It's a little hard for those of us who live in the oil-rich State of Texas to be as concerned with the problems of commercial nuclear energy production as are the Easterners. But for over 20 years commercial nuclear plants have been producing electrical energy and radioactive wastes in prodigious amounts. By 1981, there were already 9000 metric tons of high level nuclear wastes in temporary storage; by the year 2000 there will be 72,000 metric tons highly radioactive of spent fuel awaiting permanent storage. One of three sites will be selected to store the waste. We here in the Texas Panhandle are "lucky" enough to be neighbors to one of these three potential dump locations.

Since the Department of Energy has primary responsibility for the final selection, I want to introduce as our first speaker Dr. Alvin Williams from the Office of Civilian Radioactive Waste Management of the United States Department of Energy. Dr. Williams.

Following Dr. H. Gordon Leeds

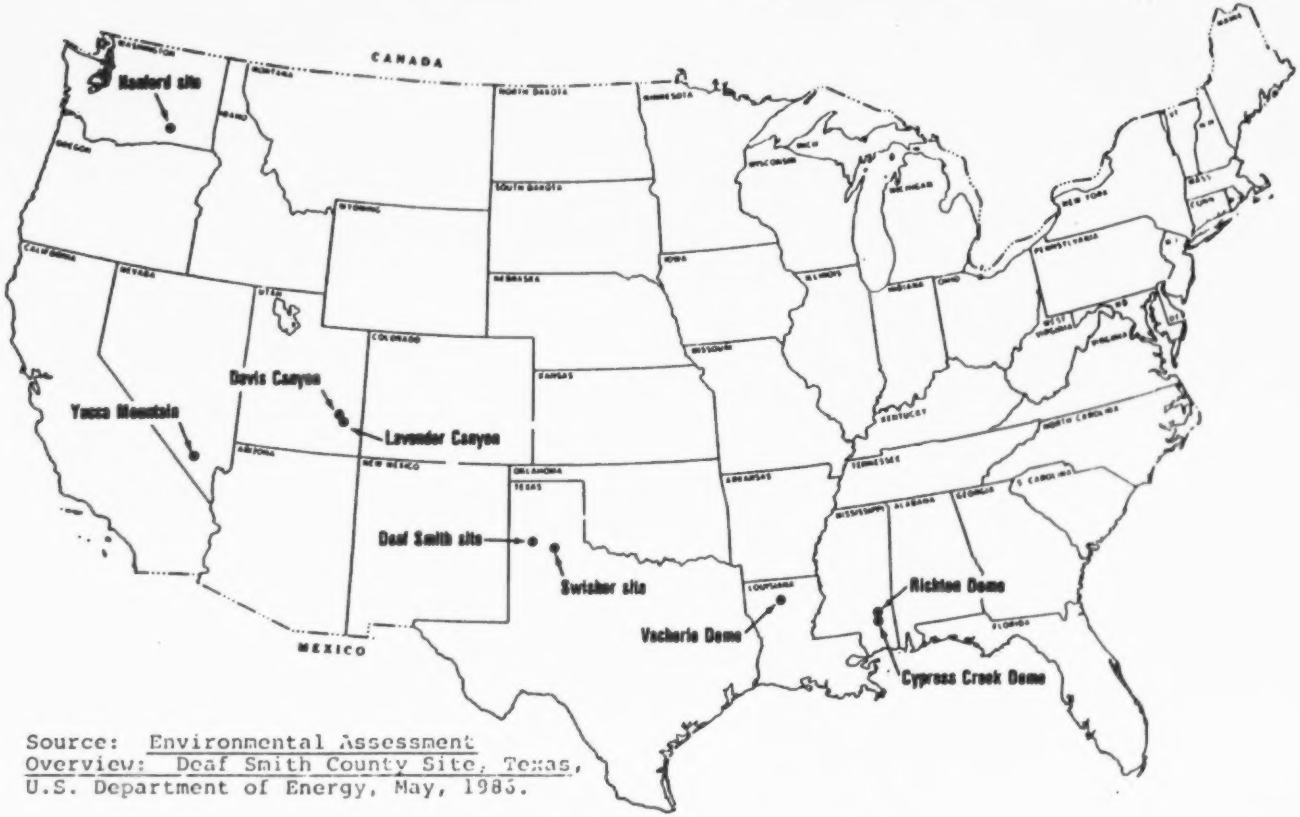
(cue: "adequately protected from the hazards posed by such waste.")

Thank you, gentlemen, for your explanations. I am sure that our audience has many questions for you. But, before we begin the question and answer period, I'd like the members of the audience to introduce themselves:

(Wait for role cards to be passed out; then, ask participants for names and introductions.)

Thank you. In order to handle our questions more efficiently, the panelists have asked that you meet first in groups to identify your major concerns and to properly frame your questions. You will note that your name tag is one of four colors. Please join with others of the same shade at the location indicated. Write the questions you want to ask the experts on the large pad at that spot.

Figure 1. Potentially acceptable sites for the first repository.


CANADA
Hanford site
Davis Canyon
Yucca Mountain
Lavender Canyon
Deaf Smith site
Swisher site
Vacherie Dome
Richton Dome
Cypress Creek Dome
MEXICO

Source: Environmental Assessment Overview: Deaf Smith County Site, Texas, U.S. Department of Energy, May, 1985.

ROLE CARD: Dr. Alvin Williams,

You have been asked to speak to an informal open meeting sponsored by the Amarillo League of Women Voters. A representative of the United States Department of Energy, Office of Civilian Radioactive Waste Management.

Your opening remarks:

The Nuclear Waste Policy Act of 1982 established a process to select sites for permanent disposal in geologic repositories of commercial spent nuclear fuel and high level radioactive waste. The first step in this process was to identify potentially acceptable sites and to develop general guidelines for siting repositories. In February, 1983, the Department of Energy identified 9 sites in 6 states as potentially acceptable for the first repository. (Map Fig.1 on previous page) Deaf Smith County, Texas was identified as one of those sites. The DOE is now proceeding with 3 sites as suitable for site characterization based on a program of detailed studies and environmental assessments drawn from hundreds of technical reports. After the nomination of the sites by the Secretary of Energy, the Act provides 60 days for the President to approve or disapprove the candidate sites.

The potentially acceptable site in neighboring Deaf Smith County has been evaluated in accordance with the DOE's General Guidelines for the Recommendation of Sites for the Nuclear Waste Repository. On the basis of the evaluation, the DOE has found that the Deaf Smith site is not disqualified under the guidelines. A formal information gathering process that will include the sinking of one or more shafts at the site and a series of experiments and studies underground will follow.

To continue our background statement, I'd like to turn the podium over to my distinguished colleague, geologist Dr. Henry Peterson.

ROLE CARD: Dr. Henry Peterson, Geologist

Your opening remarks:

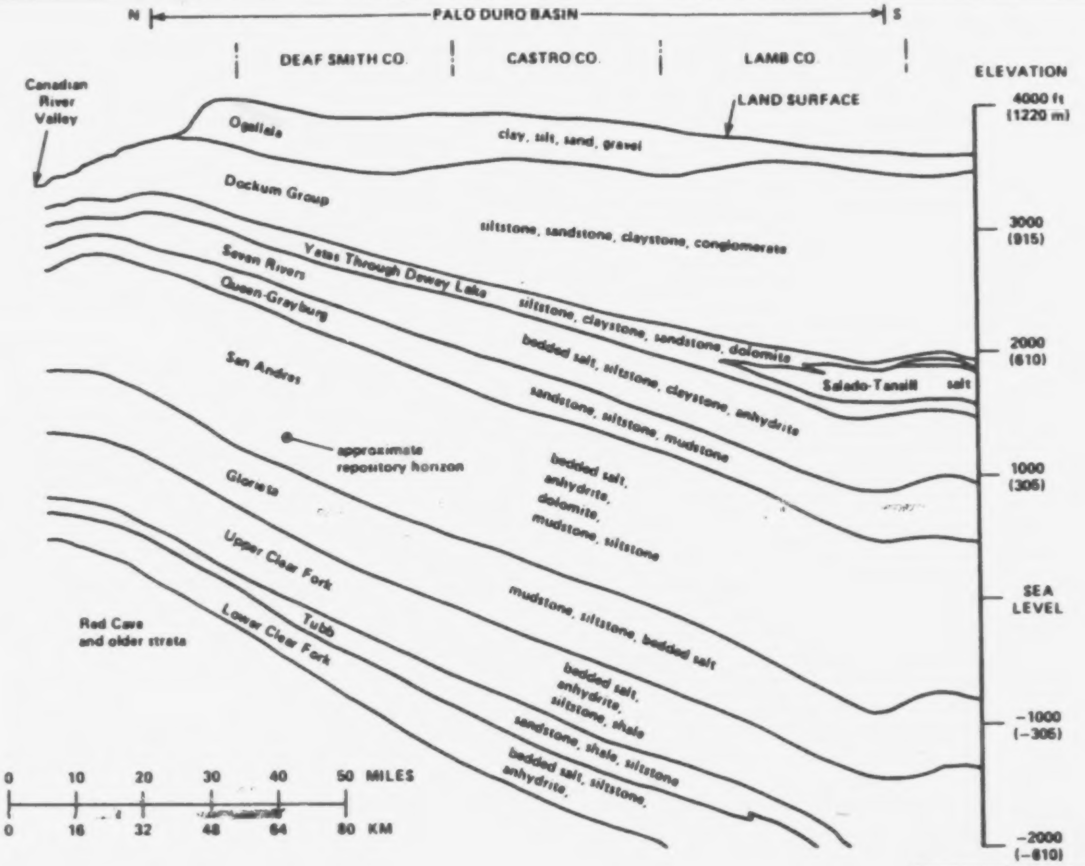
The Deaf Smith County site is in the bedded salt Permian Basin, which is one of five distinct geohydrologic settings considered for the first repository. The site is in the north central part of the county southwest of Amarillo and lies in the Palo Duro Basin within the larger Permian Basin.

The host rock at repository depth is a sequence of bedded rock salt about 160 feet thick. The top of the proposed repository level is about 2400 to 2500 feet below the surface. In comparison with other regions of the United States, the Palo Duro basin is stable tectonically. No active surface faults have been identified in the immediate vicinity of the Deaf Smith County site. Records indicate no reports of earthquakes closer than 30 miles from the site.

The ground water regime beneath the proposed site on the southern high plains consists of 3 major hydrogeologic units: (Pass out diagram, Fig. 2)

1. The Ogallala formation and Dockum group called the High Plains Aquifer, which recharges to the west in New Mexico. This aquifer is the principal source of fresh water in the 7-county area including Deaf Smith County and is mostly used for irrigation.

2. A 5000-6000 foot aquitard of shale and


N
PALO DURO BASIN
S
DEAF SMITH CO.
CASTRO CO.
LAMB CO.
ELEVATION
Canadian River Valley
LAND SURFACE
Ogallala
clay, silt, sand, gravel
Dockum Group
siltstone, sandstone, claystone, conglomerate
Yates Through Dewey Lake
siltstone, claystone, sandstone, dolomite
Seven Rivers
bedded salt, siltstone, claystone, anhydrite
Queen-Grayburg
sandstone, siltstone, mudstone
Salado-Tansill
salt
San Andres
approximate repository horizon
bedded salt, anhydrite, dolomite, mudstone, siltstone
Glorieta
Upper Clear Fork
mudstone, siltstone, bedded salt
Tubb
Lower Clear Fork
bedded salt, anhydrite, siltstone, shale
sandstone, shale, siltstone
bedded salt, siltstone, anhydrite,
Red Cave and older strata
4000 ft (1220 m)
3000 (915)
2000 (610)
1000 (305)
SEA LEVEL
−1000 (−305)
−2000 (−610)
0 10 20 30 40 50 MILES
0 16 32 48 64 80 KM

Geologic Cross Section of Deaf Smith Site Area

Figure 2

Source: Environmental Assessment Overview: Deaf Smith County Site, Texas, U.S. Department of Energy, May, 1986.

evaporites in the middle of which would lie the repository horizon.

3. A brine aquifer with no surface discharge. The features of the bedded salt at the Deaf Smith County Site that could contribute to its ability to isolate waste from the accessible environment include:

1. low permeability of the host rock salt and the long time predicted for ground-water travel to the accessible environment

2. presence of downward ground-water gradient from upper to lower aquifers

3. favorable geomechanical and geochemical properties of the host unit. In other words, the host rock has the ability to rapidly dissipate heat generated by emplaced waste, which reduces the potential for heat induced fractures.

I trust these few remarks will begin to give you some indication of the geologic considerations that went into nominating the Deaf Smith County site as suitable for characterization. Next, I'd like to introduce H. Gordon Leeds of the Nuclear Regulatory Commission who will further describe the proposed nuclear waste repository.

ROLE CARD: Dr. H. Gordon Leeds, Nuclear Regulatory Commission

Your opening remarks:

A geologic repository can be viewed as a large underground mine with a complex of tunnels occupying roughly 2000 acres at a depth between 1000 and 4000 feet. To handle the waste received for disposal, surface facilities will be developed that will occupy about 400 acres. The repository will be operational for about 25 to 30 years. After the repository is closed and sealed, waste isolation will be achieved by a system of multiple barriers, both natural geologic and engineered, that will act together to contain and isolate the waste as required by regulations.

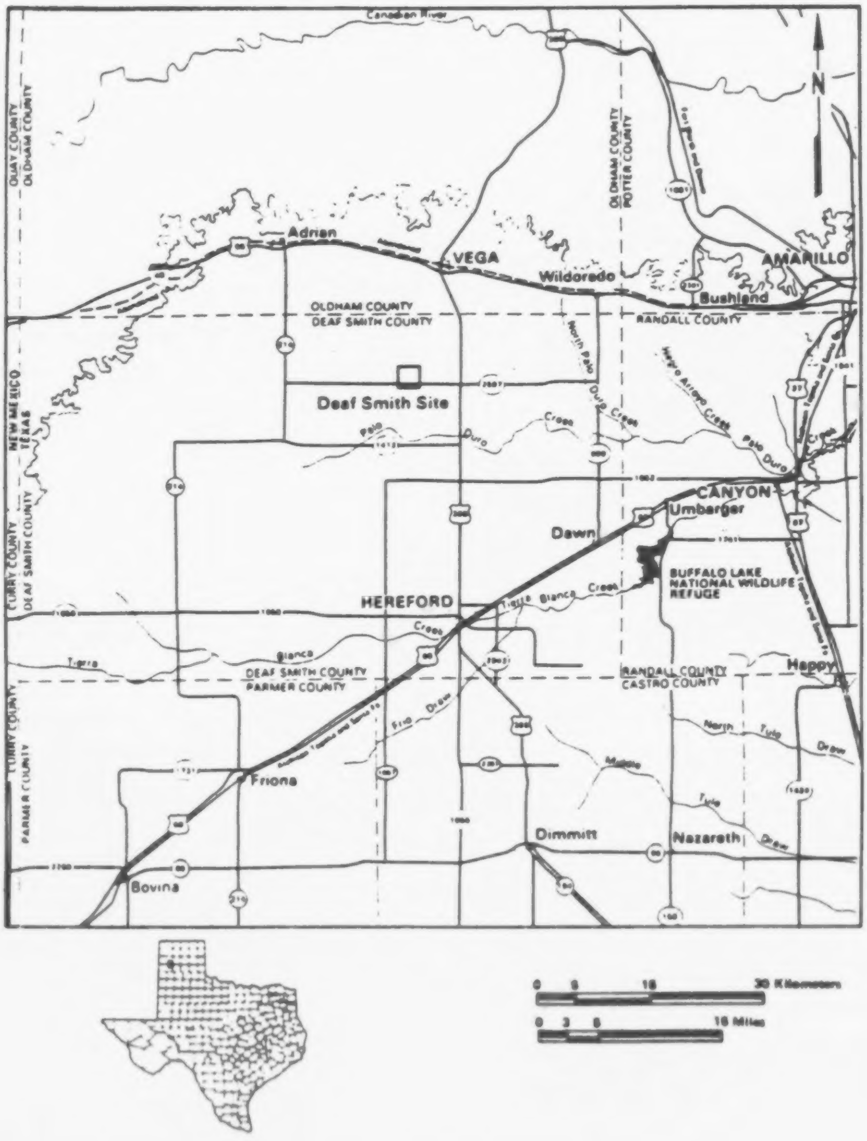
The engineered barriers consist of the waste package and the underground facility of openings and backfill materials that are used to further limit ground-water circulation around the waste packages and to impede the subsequent transport of radionuclides into the environment.

(Pass out map Fig. 3)

The Deaf Smith County site is the preferred location in the Permian Basin because it is farther from highly populated areas than the alternative Swisher County site as you will see on the map which is being handed out. It is approximately 17 miles from Hereford and 14 miles from the smaller community of Vega. This is an important consideration since Congress approved the geologic disposal of nuclear waste in order to provide reasonable assurances that the public and environment would be adequately protected from the hazards posed by such waste.

[Note: Role card numbered 6 should be one color, those numbered 7 another color, etc.]

Figure 3. Deaf Smith site, Texas.


Canadian River
N
QUAY COUNTY
OLDHAM COUNTY
OLDHAM COUNTY
POTTER COUNTY
Adrian
VEGA
Wildorado
AMARILLO
Bushland
OLDHAM COUNTY
DEAF SMITH COUNTY
RANDALL COUNTY
NEW MEXICO
TEXAS
Deaf Smith Site
North Palo Duro Creek
Palo Duro Creek
CANYON
Umbarger
Dawn
CURRY COUNTY
DEAF SMITH COUNTY
HEREFORD
BUFFALO LAKE NATIONAL WILDLIFE REFUGE
Tierra Blanca Creek
DEAF SMITH COUNTY
PARMER COUNTY
RANDALL COUNTY
CASTRO COUNTY
Happy
CURRY COUNTY
PARMER COUNTY
North Tule Draw
Middle
Tule Draw
Friona
Dimmitt
Nazareth
Bovina
0 5 15 30 Kilometers
0 3 6 15 Miles

Source: Environmental Assessment Overview: Deaf Smith County Site, Texas, U.S. Department of Energy, May, 1986.

6a ROLE CARD: Mable Young

As a newly elected member of the Hereford, Texas, City Planning Commission you are concerned with the effects of a government waste depository only 17 miles north of your community of 15,853 people.

6b ROLE CARD: Gil White

You are one of three county commissioners for Deaf Smith County. You have heard that the DOE will condemn over 5000 acres of the county's tax base in order to secure permanent control of the land.

6c ROLE CARD: Joe Sales

As Deaf Smith County road superintendent you anticipate increased commuter traffic and trucks hauling supplies, excess salt and radioactive waste.

6d ROLE CARD: Brenda Smith

You are a representative for the Atcheson, Topeka and Santa Fe Railroad, which runs through southern Deaf Smith County. Although repository shipments on your railroad might create some problems, you would be willing to argue some benefits for rail shipment of hazardous materials.

6e ROLE CARD: Royal Hammond

You are police chief of Vega, a town of only 900, but a community that would be greatly impacted if the Deaf Smith waste site were to be developed. Besides the increased demands for local services, should development occur, you are also concerned with your community's capacity to handle emergencies or evacuations if needed.

6f ROLE CARD: Mervyn Sliddell

As Deaf Smith County Water Commissioner you have seen some figures that indicate 529 acre-feet of water will be required the very first year of development of a nuclear waste repository.

7a ROLE CARD: Claudia Hansen

As President of the Hereford Chamber of Commerce, you have heard that once the waste repository is operating about 1100 new jobs will have been created.

7b ROLE CARD: Dr. W. A. Tooley

Long active in the Amarillo medical-hospital community, you have read widely enough to know that during the Three Mile Island disaster in Pennsylvania, there were crucial staffing problems at local hospitals outside the immediate 5-mile zone. Doctors, nurses, and staff with young children stayed away not only because they were evacuated but because responsibility to family came before work.

7c ROLE CARD: Sharon Gabehart

As spokeswoman for the Association of Greater Amarillo Women's Clubs you have long been proud of the friendly, relaxed life style in the High Plains. Now you foresee construction of a waste facility just over the county line that will generate dust, noise and a 55-acre, 39-foot-high salt pile dug out of the earth.

7d ROLE CARD: Phil Lippman

Although a resident of Amarillo, you attend college in New Mexico, so you've heard that some people around Carlsbad are still angry over their experiences with the Department of Energy. They felt they weren't consulted over a waste disposal project, that the government kept changing the terms of the agreement, that Congress and the Nuclear Regulatory Commission fought over control of the project, and that the DOE wouldn't sign an agreement until the State of New Mexico threatened to sue.

8a ROLE CARD: Andy Howell

You are a farmer southwest of Amarillo in Deaf Smith County. Although the farm has been in your family four generations, you are ready to give it up. The cost of electricity is constantly rising; you had to pay the REA $2,000 last spring just to start the pumps to irrigate your corn. You are going to have to drill your wells deeper pretty soon for the water table has dropped 400 feet. Without irrigation this land will go back to mesquite.

8b ROLE CARD: Glenda May

Since your husband is a construction worker you are anxious to know about any project that might get built in the Vega vicinity.

8c ROLE CARD: Alec Mazur

You're still living on the farm outside Canyon, Texas, but it hasn't supported your family for the last 10 years. Any other kind of job is hard to find, however. You've heard that construction of the waste dump would take 7 years and that they'd need at least 400 workers to get started.

8d ROLE CARD: Larry Bucaro

You farm over 2,000 acres of what the Soil Conservation Service classifies as prime farmland soil, like most of the land in the designated area for a waste repository. Most of the regional and local economy depends on farms like yours producing corn, sorghum, wheat, sugar beets, cotton, and cattle, with sprinkler irrigation. The DOE has warned you that current land use will be "disrupted.". They want 61 acres to construct an Exploratory Shaft Facility and access road.

9a ROLE CARD: Faye Brockman

You represent a state wide group of environmentally-aware citizens of Texas. Your group has done some research on the proposed waste site and has found out that:

. . .the host rock of the proposed repository is not pure rock salt but includes many impurities

. . . active fronts of salt dissolution have been identified along the western, northern, and east margins of the Palo Duro Basin. The advancing north front is only 18.5 miles from the Deaf Smith County site. It will take 10,000 years for proper waste isolation.

. . . fractures have been identified in rock strata near the site. Undetected faults may exist in the area. A fault striking northwest beneath the site has been inferred from oil exploration. The historical record of earthquake activity covers less than 100 years. There was a small earthquake only 15 miles northwest of the site in April, 1985. There is the potential for increased tectonic activity in the next 10,000 years.

. . . the speculative nature of DOE conclusions are not technologically trustworthy: NRC standards specify waste packages should contain waste for 300 to 1000 years. The DOE says "Current information on corrosion metals like those used for waste cannisters suggests a lifetime. . . expected to exceed 10,000 years."

. . . The DOE admits in its technical guidelines that groundwater travel time and flow rate to the accessible environment is the most important consideration. It also admits that at each of the proposed sites "there are uncertainties in the conceptual ground-water flow model. . . "

. . . The DOE has admitted that climate change is "the only factor that has a likely potential for significantly affecting the hydrologic system. . ." A major climatic change did occur 5 to 10,000 years ago.

. . .In answer to concerns about human interference in the centuries after the repository is closed, the effectiveness of markers and records warning of the hazard, the impact of political instability, the DOE has responded that such concerns are "less important because their potential is based on speculative or indirect evidence."

9b ROLE CARD: Kurt Burris

You are an official of the State Task Force on Health and Safety. Uppermost among your concerns is the transportation effects of hauling supplies, excess salt, and radioactive waste through a number of Texas communities on the way to the waste site. Risks are expected to be less if rail transport is used but a special spur would have to be constructed. There is on estimated cost of $1.12 billion for rail transport compared to $1.13 for road transportation.

9c ROLE CARD: Mike Corson

As State Superintendent of Highways you are aware that the Deaf Smith County waste site is 19 miles from the nearest rail line and only 4 miles from the nearest major highway. In contrast, the other potential Texas site, Swisher County, is right on the rail line but 6 miles from the highway. In addition, the cost of building an access railroad to the Swisher site is $3.5 million, while the cost for Deaf Smith County is between $21 and $44 million.

You have also found out that while the Price-Anderson Act provides federal insurance for accidents at nuclear power plants, it does not apply to transportation accidents on the way to waste repositories.

9d ROLE CARD: The Rev. Mr. John Diak

You speak for the Council of Churches, which is concerned with the quality of life and social problems in the potentially-affected communities of Amarillo, Canyon, Hereford, and Vega. There is concern as to the effect of the immigrating workers on the existing population and their compatibility with the lifestyles and beliefs of the current residents.

9e ROLE CARD: Herb Dransfeldt

Because you are a State Senator you feel the technical aspects of the siting of a waste repository in Deaf Smith County are overemphasized. The social and political aspects of the problem are more your concern. There is a perception in the Texas legislature that the federal government cannot be counted on to keep its word on waste management matters or that the federal budget process can assure adequate and stable long term funding to achieve final isolation of nuclear waste.

DENVER DISASTER: RELOCATION OF FORCED MOVERS

SENIORHIGH

This inquiry role-playing activity, which requires three to four days will acquaint high school students with some of the difficult contemporary problems of urban geography. Students will participate in an activity involving three groups of forced movers coping with various disasters. The three disasters are: displacement due to the pollution of a neighborhood by hazardous waste; public displacement due to construction of a Light Rail Transportation system; private displacement caused by gentrification. The three groups of people must deal with their relocation in the Denver Metropolitan Area. Through this activity students will learn about urban structure and discover the criteria people use to select a site for personal residency and how they cope with relocation. This role-playing activity covers the four themes of Place, Location, Movement, Humans and Environments from the Guidelines for Geographic Education: Elementary and Secondary Schools (NCGE/AAG 1984).

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Objectives

Students will:

1. Become familiar with urban geography concepts, such as central business district, suburbs, Standard Metropolitan Statistical Area (SMSA), and gentrification.
2. Learn to gather data, and to interpret and use different types of maps.
3. Use critical thinking skills to make a decision to solve a problem.
4. Learn locations are linked by flows of people, goods, and services creating inter-dependence on a local scale.
5. Learn that local places vary in their population composition, transportation and communication networks, and recreational activities.
6. Identify and interpret interactions and interrelations between people and their environments.
7. Discover that all places have advantages and disadvantages for human settlement which are evaluated in deciding relocation.
8. Consider spatial relations in determining where to relocate in Metropolitan Denver Area.
9. Learn that the city represents the most humanly modified environment on the earth.
10. Be able to understand that human ideas and actions shape the character of places.
11. Discover how peoples' actions produce both intentional and unintentional consequences.

DENVER DISASTER: RELOCATION OF FORCED MOVERS

Materials

Preliminary Activities:
* Urban Geography Vocabulary
* Map Skills Review Activity
* Gentrification Information (for the teacher)

Neighborhood Materials:
*Denver-Boulder, Colorado Standard Metropolitan Statistical Area Maps
*Denver and Adjacent Areas Map
*Bus System Map of Denver Area
*Red Markers
*Chalk/Blackboard

Role-Playing Scenarios:
*Environmental Protection Agents
*City Council Members
*Real Estate Agents
*11 Neighborhood tables
*3 Forced Mover Descriptions
*Forced Movers Chart
*Day Care Center Locations Information
*Public Housing Locations Information
*Neighborhood Suitability Chart

Grade Level 9-12

Time 2-3 days

Teaching Strategy

Day 1

1. Teachers should determine which Preliminary Activities their students need before beginning Denver Disaster: Forced Movers. The "Urban Geography Vocabulary" activity covers terms that students must understand to participate in Denver Disaster. The "Map Skills Review" activity checks the students' ability to interpret various maps used in this activity. Students must be able to use these maps so check for understanding before proceeding.

2. The teacher should present the critical aspects of gentrification, hazardous waste, and light rail to the students before beginning this activity.

Day 2

1. To open the Denver Disaster activity the teacher should have students brainstorm the criteria for a move; discuss the critical difference between personal choice relocations and forced moves; and determine the most important factors in selecting a relocation site. The teacher should use the following questions to guide the brainstorming activity and write student responses on the blackboard.

Why do people move?

What events or circumstances would cause a forced move?

Can these forced moves be categorized? (Public, Private, Disaster)

What criteria would forced movers consider in selecting their neighborhood for relocation? The teacher should be sure student responses for the last question include the following factors:

Transportation and Communication routes
Economic factors, such as price range of housing, rental cost
Availability of housing
Type of housing
Social Characteristics of neighborhood
Schools
Shopping
Recreational facilities

2. The teacher should give an overview of Denver Disaster: Forced Moves, so students will understand the instructions and expectations.

3. Each student should be assigned one of the three scenarios to role-play. Divide the class equally among the three roles. The three scenarios include:

a. Environmental Protection Agents helping a group of forced movers to relocate due to contamination of their neighborhood by hazardous waste.

b. City Council Members helping a group of forced movers to relocate because their old neighborhood will be used to construct a light rail transportation system.

c. Real Estate Agents helping to relocate a group of forced movers to allow realtors to gain property for gentrification. Each scenario describes a group of people being forced to move (public, private, or disaster displacement). Each group is being helped by one of three roles: EPA, City Councilor, or Real Estate Agent.

4. Students should read their scenarios and be sure they understand the situations.

5. Class will be divided into six groups of approximately five people (two groups of 5 people for each of three scenarios).

6. Students will read the description of their group's forced movers and chart their characteristics on the "Forced Movers Chart." This allows students to understand the needs of their forced movers and have data readily available for the activity.

7. Each group will be assigned three neighborhoods in the Metropolitan Denver Area and will study its suitability for their groups' relocation. Students must determine and select the most suitable location for their forced movers' settlement. To accomplish this, students must study and interpret the statistics on each of these neighborhoods.

8. There are eleven neighborhoods that the teacher can select to vary the neighborhoods given to each group. Teachers can add other areas by using the 1980 Denver-Boulder Census of Population and Housing for information.

9. Each group should locate its three neighborhoods on the Census Track Map. Each group should write down the major streets that create the boundary for its three neighborhoods to fix their location for future use in this activity.

Day 3

1. Groups should use the boundaries they wrote down the day before and the descriptions given in the neighborhood tables to locate their three neighborhoods on the Denver and Adjacent Areas Map. They should use a red marker or pencil to outline the neighborhoods on the map.

2. Each group should divide into three smaller groups one for each of its neighborhoods. Each smaller group should complete a "Neighborhood Suitability Study." This can be completed by students studying and gathering data from the Bus System Map and the Neighborhood Tables.

3. After the "Neighborhood Suitability Study" is completed for three neighborhoods the groups should reassemble to discuss their findings. They should compare the "Forced Movers Chart" to the suitability information and "Neighborhood Tables" for each neighborhood.

4. After each neighborhood has been evaluated according to the forced movers' characteristics, the group should select the best neighborhood for their group's relocation.

5. Each group should prepare a presentation for the entire class. The class will role-play the forced movers. Each group acting as EPA agents, city council members, or real estate agents should persuade the forced movers (class) why their selected neighborhood is the best. The groups should use advertising techniques, jingles, slogans, or other persuasive methods to add realism to the presentation. The presentation should be approximately 8-10 minutes, no longer.

6. The teacher should brief the class before each presentation on which group of forced movers they are role-playing. This will help the class understand if the presenters' neighborhood is suitable for the group they are role-playing. After the presentation, students may ask questions.

Debriefing

1. After all groups have made their presentations, the teacher should debrief the class on teaching outcomes and concepts covered by Denver Disasters: Forced Movers.

2. The teacher can debrief this activity with a teacher directed class discussion, or written assignment on questions for homework.

Evaluation

1. The teacher can decide how to determine a grade for each group. The teacher can assign a point value for each activity totaling up for a group grade. For example, students can earn a specific number of points for completion and accuracy of these activities:

Urban Geography Vocabulary
Map Skill Review
Forced Movers Chart
(3) Neighbor hood Suitability Study
Group Presentation
Debriefing (participation in class discussion or written assignment).

2. The teacher can check student comprehension by including information from this activity on a test. If a general Denver Unit is used a simplified map could be given as a quiz with a few main streets and landmarks required. If Denver Disasters: Forced Moves activities were included in a unit on urban geography, test questions on general features of the American urban landscape and/or how Denver illustrates these features could be included.

Follow-up Activities (optional)

1. Each group could do a presentation to the state or a federal agency on what its neighborhood most needs (e.g., the Department of Housing and Urban Development). This would relate to city/state planning decisions.

2. Students could use field work to study the Denver neighborhoods' typical house architecture, street layouts, visual decay, traffic flow, pollution, etc. Students could develop slides during field experience showing examples of Denver area architecture, landmarks, or history of Denver.

3. Students could use the Neighborhood Tables data to graph age of houses in their neighborhoods which would show the history of Denver's growth (e.g., relatively few houses built in the 1930s and 1940s).

4. Students could explore political issues relevant to their local community or state. In the Denver area this could be public transportation question and/or air quality issue (e.g., Light Rail System). Students could research landfills and other environmental problems in the urban area (e.g., Eaglecrest High School controversy in Cherry Creek School District located near Lowry Landfill).

5. A specific unit on the structure of American cities and how cities developed could be related to growth of the Denver Metropolitan area.

DENVER DISASTER: RELOCATION OF FORCED MOVERS

Teacher Information

Neighborhood Tables

(See the Census tract map and the Denver City street map): these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Students could use these data and calculate average number of people per household themselves. The year built data on housing could be graphed, either by the students or by the teacher to give the students practice in interpreting graphs. The data on average mortgage costs is probably a bit low because it includes people whose mortgages are older, for smaller loan amounts, and at lower interest rates. If the teacher uses slides of the areas, and/or the students take field trips to the different areas, the statistics will take on more meaning and the students will begin to grasp some of the basic ideas behind the structure of American cities.

These neighborhood data could be used independently of the Denver Disaster scenario to give students some training in the built environment. Then a selection of the neighborhoods could be used with the rest of the inquiry lesson to help students begin to tie people's housing needs with the kinds of neighborhoods in which they might locate. Keep in mind that the movers being dealt with in this scenario are forced movers, and so have relatively little time to make their decisions and relatively little choice. General residential mobility is undertaken for different kinds of reasons and people usually search longer to find a house and neighborhood that fits their needs.

Forced Movers

In this activity students are attempting to help relocate households that have been forced to move by outside circumstances. There are three distinct sets of these movers. One set is being displaced by the discovery that their housing development was built on top of an old landfill containing hazardous waste. The second is forced to move because their homes are being torn down to make room for a new light rail transportation system. The third group is being displaced by the upgrading of their old neighborhood into condominiums and historic residences for relatively wealthy people. The following detailed descriptions are intended to give the student an idea of the kinds of people to whom these events might happen. These characteristics are also important in helping to determine the kinds of areas in which these people might be successfully relocated.

Teacher Information on Gentrification

Recent urban history in the United States has been dominated by the movement of people (in particular the white, Anglo middle class) out of the cities to the suburbs and rural areas of the country. In some places, however, there has been a counter trend of relatively well off people moving back to urban areas. This counter trend has received media attention as a "back to the city" movement or urban revitalization. The academic literature ha dubbed it "gentrification", a term originating in England to describe the process of "the gentry", or upper classes, taking over a neighborhood. At the national scale gentrification has not taken place in large enough numbers to reverse the trend away from the cities. In some local areas, however, it has had important impacts.

Usually a gentrifying area is relatively near downtown and has good transportation connections. It is often an area of special historic and/or architectural interest. Before the improvement process starts this kind of area may be somewhat run down, though seldom structurally unsound or extremely dilapidated, and often provides relatively inexpensive housing for its residents. These people (referred to hereafter as the original residents) may be elderly homeowners who have watched the area decline around them, renters who like the relatively low rents and good accessibility, remnants of an ethnic community historically located in the area, and so on. The neighborhoods may contain single or multifamily housing and their other characteristics vary a great deal from place to place.

The back to the city process might start with one or two middle class households deciding to buy homes in the area because of its accessibility, character, and cheapness. As they remodel and improve their units other better off households might adopt the idea, move in, and do the same. Since these households are better off than the original residents they can easily outbid them for housing. As the area's housing improves, the new residents often agitate for street repairs, landscaping, better services, and stricter building code enforcement in the neighborhood. Property taxes may increase. Increased demand for the housing, stricter code enforcement, and higher property taxes (or special assessments) may make the dwellings too expensive for the current residents who are forced to move (i.e., privately displaced), opening more units for new households to refurbish.

City officials and many city residents approve of gentrification because it beautifies the city, cleans up blight, improves the tax base, and brings better off residents back to the city. The people who are forced to move, however, undergo the trauma and cost of moving and of searching for a new home. The community they had is completely altered, and some of the city's lower cost housing stock is removed. The decline in the supply of low cost housing may have the effect of increasing the cost of housing to all low income residents of the city. In other words, the city administra-

tion, those interested in historic preservation, and the better off population.

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LeGates, Richard T. and Chester Hartman. "Displacement", Clearinghouse Review, Vol. 15, 207 - 249, 1981.

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Urban Geography Vocabulary

Use the terms on the last page to complete the vocabulary definitions

1. : an area of a city defined by the federal government for the purpose of collecting census data. The average size is 4000 people, and only the urban areas of the country are divided this way.

2. : the movement of middle and upper class people to city neighborhoods that were formerly occupied by working class and poorer households.

3. : a form of transportation using passenger conveyances traveling on or suspended from tracks in a fixed right of way.

4. : the politically separate communities near a city or large town.

5. : to compel people to move to a new location

6. : the act or process of being forced to move from your home.

7. : an incorporated place with a large population that contains a mix of residences, services, businesses, and other such features. Of greater size, population, or importance than a town or village.

8. : the study of cities, their internal structure, and their place in systems of cities.

9. : refuse containing toxins that can cause health problems or is dangerous for other reasons (such as being highly flammable).

10. : public transportation capable of moving large numbers of people within metropolitan areas.

11. : a government agency that deals with problems affecting the physical environment, especially problems caused by human activity.

12. : a system of trash or garbage disposal in which the waste is buried between layers of earth.

13. : the focal point of a city, usually the area of maximum land value and building height. Often the center for retailing, financial, or administrative facilities.

14. : the central residential core of an urban area. In most American cities this area contains some of the lowest income people in the city, though it may also have pockets of higher income groups in well-defined areas.

15. : an area defined by the federal government for the purpose of collecting census data. It's central city is a city of at least 50,000 people, and it includes the surrounding communities with strong connections to the central city (such as newspaper delivery, television reception, commuting, and shopping).

Vocabulary Terms:

Central Business District (CBD)
Census tract
City
Environmental Protection Agency (EPA)
Forced relocation
Gentrification
Hazardous waste
Inner city
Landfill
Light rail
Mass transit
Residential displacement
Standard Metropolitan Statistical Area (SMSA)
Suburbs
Urban geography

Map Skills Review

Directions

DENVER DISASTER: RELOCATION OF FORCED MOVERS

SENIOR HIGH

This activity will acquaint you with the three maps used in "Denver Disaster: Relocation of Forced Movers." You will use these three maps to answer the following questions: Census Tract Map, Denver and Adjacent Areas Map, and Bus system Map-Denver Areas.

1. What do the numbers such as 15 or 70.24 denote on the Census Tract Map?

   ____

2. Name the five boundaries that create Census Tract 16.

   ______________________ ______________________

   ______________________ ______________________

   ____

3. What is the difference between the thick gray line and the solid black line on the Census Tract map?____

4. Why are the Census Tracts near the CBD so much smaller in area than those in the suburbs?

   ____

5. What is the purpose of the letters and numbers along the edges of both the Denver & Adjacent Areas and Bus Systems Map?____

6. Refer to the Denver & Adjacent Areas Map, where would you look first to help you quickly locate Roanoke Place?____

   What are the map coordinates used to locate Roanoke Place on the Denver & Adjacent Areas Map?____

7. What does the symbol represented by dotted black boundaries with a pink colored area and a red square mean on the Denver & Adjacent Areas Map?

   ____

8. Locate the inner section of Washington Street & East 73rd Avenue, coordinates F, 11. What does the number "700" mean?

____

To which of the two above streets does it refer?

____

9. Name five suburbs of the Denver Metropolitan Area.

______________ ______________
______________ ______________
____

10. Name five interstate highways in the Denver Metropolitan Area.

______________ ______________
______________ ______________
____

11. Find the Downtown Denver inset on Denver & Adjacent Areas Map, on what street is the Madison Denver Hotel located?

____

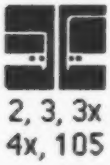
12. Use the Bus System Map-Denver Area for the rest of the questions. The color circles on the map denote route names. What is the difference between a blue designated route and a red designated route?______________________________

13. What do these symbols mean on the Bus System Map?

a. ■

c. ▲

b.



d. ▬ ▬ ▬ ▬ ▬

14. Look on the other side of the Bus System Map, what information can you find on the five specialty maps?

____________________ ____________________

____________________ ____________________

____

15. Using the schedule at the bottom of the Bus System Map, notice Route 11, East Mississippi stop, that the first trip departs at 5:09 on weekdays. What is the maximum waiting time between buses for early service?

____

Using the same Route 11, East Mississippi stop, when does the last bus leave on a Saturday?

____

16. What bus route would you take to get from Overland High School, coordinates V, 19, to the Nine Mile Park & Ride?

____

What kind of route is this?

____

SENIOR HIGH

DENVER DISASTER: RELOCATION OF FORCED MOVERS

Student Instruction Sheet

Read the complete directions before beginning your group project. You should also refer to the instructions after each step is completed, to be sure you have accomplished all the requirements.

1. The class will be divided into six groups. There are three roles: Environmental Protection Agents; City Council Members; and Real Estate Agents; your group will be given one of these roles to play. Everyone in your group will have the same role.

2. Read your Role Scenario and Forced Movers Information. The object of this activity is to successfully relocate your group of Forced Movers to the neighborhood best suited for the entire group.

3. You will be given a "Forced Movers Chart" to complete using the information given in your role scenario.

4. Each group will be assigned three neighborhoods to consider for their Forced Movers relocation. You will be given three "Neighborhood Tables" with information about each of these neighborhoods. First, you should locate all three neighborhoods on the Census Tract Map in the front of the room. Write down the major boundaries for each of the neighborhoods. Next, locate your three neighborhoods on the Denver & Adjacent Areas Map and outline the boundaries of your neighborhoods in red marker.

5. Now, divide your group into thirds. Give each of the smaller groups one of the neighborhoods to study in detail, by completing the "Neighborhood Suitability Study." The "Neighborhood Suitability Study" information can be found by studying the "Neighborhood Table, the Denver & Adjacent Areas Map, and the Bus System Map-Denver Area.

6. After the three "Neighborhood Suitability Studies" are completed, reassemble your group to discuss and compare each neighborhood to the needs of your group of Forced Movers.

7. Select the best neighborhood that satisfies your Forced Movers. (This can be done by majority vote of the group, if there is disagreement.)

8. Now, your group should write a paragraph explaining why you selected this neighborhood.

9. Your group will be expected to make an 8-10 minute presentation to the class. The class will be role-playing your group of Forced Movers, you must convince them that the neighborhood you selected is the best for them. Your presentation should be persuasive, and use techniques that will be interesting. (Humorous presentation methods, jingles, songs, unique presentation techniques, etc.)

10. Your grade for this Denver Disaster Project will be a group grade. These items will be given specific point values to determine your grade:

Urban Geography Vocabulary
Map Skills Review
Forced Movers Chart

Three-Neighborhood Suitability Studies
Paragraph on best relocation site
Class presentation

Neighborhood Suitability Study

General Area_______________________________________

Use Neighborhood Tables and interpret Bus Map-Denver Area to gather information on this neighborhood's characteristics

Categories	Statistics
Economic Factors	
Availability of Housing	
Housing Cost	
Rent	
Mortgage	
Job Availability	
Public Housing in Area	
Child Care in Area	
Schools	
Transportation	
Type Available	
Bus Route	
Time to Work	
Social Category of Neighborhood	
Hospitals	
Shopping	
Recreation or Entertainment	
Other Factors	

Forced Movers Chart

Reason for Move_______________________________________

Categories	Statistics
Number of Households	
Head of Household	

DENVER DISASTER: RELOCATION OF FORCED MOVERS

Median Age

Educational Level

Marital Status of Household

Children

School Age

Average Yearly Income

Number of Homeowners

Amount of Mortgage Payments

Number of Renters

Monthly Rent

Public Housing

Settlement Money

Time Allotted for Relocation

Type of Old Neighborhood

Desire to Buy, or

Desire to Rent

Area Preference for New Neighborhood

Available Transportation

Travel Time to Work

Special Concerns

Environmental Protection Agents (EPA) Role Scenario

As an Environmental Protection Administration (EPA) Agent of the United States government, you have been assigned to relocate a group of people forced to move due to a hazardous waste spill. Hazardous waste contamination surfaced when local EPA agents were drilling shallow wells in the Lowry Landfill. The EPA was drilling for samples to determine the type of toxic waste present. While drilling the wells a large fracture induced by the drilling allowed contamination from Lowry Landfill to begin seeping into area surface water. The contaminated water began seeping northward downhill to a suburban area causing severe health problems to the community. The people in this neighborhood must be moved before health problems worsen and before negative publicity intensifies. You as EPA agents must find a suitable relocation neighborhood for this group of forced movers. Your job is on the line! If you handle this situation promptly and properly, you are guaranteed a promotion. If not you will be made the scapegoat and fired!

People Forced to Move By the Discovery of Hazardous Wastes

There are about 40 households in this group, most of them are married couples with one or two school-age children. There are some divorced parents with children as well. Five of the household heads are black. The median age of this group is 35. The average family income is about $18500 per year. Nearly all of the adults graduated from high school. Half of the households are moving from homes that they owned or were buying (they are getting a settlement from the builder, so they will have some down-payment money). The other half were renting their homes.

This group of people needs to find housing quickly because they have to move immediately. Their old neighborhood is in a suburban area, and people use a variety of different methods of transportation to get to work, with the private automobile predominating. Most of them are able to get to work within 18 - 20 minutes from this location. The renters are paying $350 a month, on the average, in rent. The owners are paying $400 a month in mortgage payments.

The people forced to move by this disaster want to keep the same jobs, own their homes, and stay in a suburban area, but they are willing to take what they can get for a short period of time while they continue to look. Most of them have some down-payment money available.

City Council Members Role Scenario

As a City Council Member, you must help a group of people relocate because they are being displaced due to construction of a fixed guideway rapid transit system (Light Rail Rapid Transit System). The decision to build a light rail system in the Denver Metropolitan Area has been a long-debated and controversial issue. Many studies and proposals have been debated but none have captured public support. Denver's need for a rapid transit system in the Metropolitan area has been recognized as a matter of statewide concern. This new rapid transit system will promote economic development, commerce, and improvements in air quality. Finally a public-private partnership has been created to build one corridor of a fixed guideway rapid transit system. This first corridor will go from the Southeast business area (Denver Tech Center) to downtown Denver. If this first corridor is successful, seven more corridors will be built by 1994, connecting all sectors of the Denver Metropolitan Area. This light rail plan passed in a General City Election, winning overwhelming approval from the Denver voters. At the time of the vote, no specific route for the Southeast Corridor was designated.

As a City Council Member, you helped decide the route of the Southeast Corridor. This route will of course displace voting citizens in your district. You must avoid negative publicity from the people being displaced by helping to quickly relocate them. City elections are in four months. You are running for reelection and your campaign is shaky. You must try to satisfactorily relocate this group of forced movers to prevent negative publicity to your campaign. If you don't you will not be reelected! If you satisfy this group of people it would gain enough votes to influence your reelection! You will win votes only by selecting the best site for this group.

Below is the information on your group of forced movers. Read it and study it carefully. Remember your political career depends upon it!

People Forced to Move to Make Room For the Light Rail System

About forty households are being displaced to make room for the light rail system. Half of these people are over the age of 50, and 20% are 65 or older. One third of the households are headed by women; one third of the households are black. About 1/3 of these households contain only one person. Another 1/3 contain children and at least one adult. The average household income is $13000 a year, and about 60% of the adults graduated from high school.

Ten of the households owned or were buying the houses that they are moving out of, and they have a settlement from the transportation district to help them purchase another home elsewhere. They are currently spending $300 a month on mortgage costs.

The renting households (30 in all) pay about $290 a month in rent, and cannot afford a great increase in that amount. Fifteen percent of the renters live in public housing that is being torn down to make room for the rail system. Most of the renting households would like to purchase a home, but have little money for a down-payment.

The neighborhood this group is leaving is downtown and many of the residents like it because of the good transportation to anywhere in the metropolitan area. They would not mind moving to the suburbs but are concerned about the availability of transportation and they want to keep their current jobs in Denver. Most of the households want to be able to stay in their new home without having to move again, but they are concerned about the quality of the housing they will be able to afford. They have been given three months to arrange for new housing before they have to be out of their current homes.

Role Scenario: Real Estate Agents

As a real estate agent for Century-Max Real Estate Company, you have a fantastic business opportunity involving gentrification. You can speculate in the private housing market and gain recognition for your company by helping in the urban revitalization of Denver's inner city. If you can help relocate this group of residents who are being forced to move due to rising rents and taxes in their older inner city neighborhood, your agency will get to list the properties. These properties will be listed for sale to wealthier citizens who will move into the neighborhood and renovate the old but good quality homes.

Since this area has been placed on the National Historic Register, it could mean large commissions for you and your agency. Your agency has been struggling and desperately needs this business opportunity. The landlords of these properties want the occupants to relocate within one month. These occupants can not afford to pay for your services, but you expect to list this property once they are relocated. If you can accomplish this relocation in one month, the landlords will list all their properties with your agency! Remember if you successfully relocate this group of forced movers you could make a large commission, but if you are unable to relocate these people you may be out of a job!

People Forced to Move Because of the Increase In Cost of Their Neighborhood

This is the largest group of households that need help in their relocation. There are 60 households and their former neighborhood has been placed on the National Historic Register and is attracting a lot of young couples who want to fix up the old houses and apartments. The current residents are moving because the increase in property values, property taxes, and rents make the area too expensive for them. Almost all of these movers (95%) are renters and they are leaving with one month's notice and no settlement from their former landlords to help them move to new places.

Most of these movers are in their twenties. The group consists of about 30% single women, 20% single men, and 50% married couples. Some of the households have children but the children are generally very young and haven't started school yet. The average household income is $19500 and most of the adults have graduated from high school. None of these households is currently in public housing. Six of the heads are black.

While these movers would like to own a home someday, they do not have enough money saved for a down-payment. Most of them want to find another place to rent. They are being displaced from an area on the border between Denver and an older suburb and are about evenly divided in their preference for living in Denver, in a near suburb, or in a suburb farther away. They have been paying about $325 a month in rent, on the average, but they can afford to go somewhat higher than that. They are concerned mainly with the quality of the neighborhood that they move into.

Neighborhoods To Use

Disaster Movers

Moving because of a hazardous waste leak in their neighborhood. Three groups will be assigned to them, each group will have two neighborhoods to consider. In each case I've listed the neighborhood I think will be better first, but it is quite possible that groups may be correct in arguing for the other neighborhood. I also plan to point out the possibility of putting some people in different neighborhoods when I do the debriefing (if it hasn't come up already).

group 1: Lakewood and Commerce City
group 2: Airport and near Cherry Hills Village
group 3: West Denver and Downtown

Public Displacement

Moving because of a new light rail system.
group 1: Northglenn and West Denver
group 2: Commerce City and Lakewood
group 3: Washington Park and Downtown

Private Displacement

Moving because of gentrification in the neighborhood.
group 1: Lakewood and Evergreen
group 2: Aurora and Cherry Hills
group 3: West Denver and Airport
group 4: Washington Park and Downtown

Neighborhood Table

General area: Northglenn; Census tract 93.14
Boundaries: West - Northglenn/Westminster line; North - W. 112th Ave. ext.; East - I25; South - W. 104th Ave.

1980 characteristics:

Number of people	5680
Number of households	1907
Average number of people per household	2.98
Percent married couple families	68%
Percent female headed families (no husband present)	7.2%
Number of children enrolled in school	1793
Median age	28.1
Percent of population over 65 years of age	3.4%
Percent high school graduates among adults over 25	86.4%
Number of car poolers in area	619
Average travel time to work	21.2 Min.
Percent unemployed	3.4%
1979 Average household income	$26479
Percent of families below the poverty level	4.4%
Percent of housing units owner occupied	65.6%
Number of vacant housing units for sale	8
Median price asked for units for sale	$78800
Median monthly mortgage costs	$426
Number of vacant housing units for rent	23
Median monthly gross rent	$268

Number of housing units built:

1979-1980	25
1975-1979	135
1970-1974	413
1960-1969	1302
1950-1959	64
1940-1949	0
1939 or before	0

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Commerce City; Census tract 87.06
Boundaries: West - Monaco St. to E. 72nd Ave. to Hansen; Northwest - Hansen; East - Rocky Mountain Arsenal boundary; South - E. 64th Ave.

1980 characteristics:

Number of people	4653
Number of households	1526
Average number of people per household	3.05
Percent married couple families	65%
Percent female headed families (no husband present)	13.2%
Number of children enrolled in school	1121

Median age	26.2
Percent of population over 65 years of age	7.2%
Percent high school graduates among adults over 25	56.5%
Number of car poolers in area	609
Average travel time to work	21 Min.
Percent unemployed	4.7%
1979 Average household income	$16972
Percent of families below the poverty level	10.7%
Percent of housing units owner occupied	59%
Number of vacant housing units for sale	11
Median price asked for units for sale	$47500
Median monthly mortgage costs	$287
Number of vacant housing units for rent	30
Median monthly gross rent	$282

Number of housing units built:	
1979-1980	39
1975-1979	49
1970-1974	79
1960-1969	384
1950-1959	704
1940-1949	239
1939 or before	94

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Airport; Census tract 41.03
Boundaries: West - Colorado Blvd.; North - 32nd Ave; East - Holly St.; South - E. 23rd Ave.

1980 characteristics:	
Number of people	6473
Number of households	2131
Average number of people per household	3.29
Percent married couple families	55.5%
Percent female headed families (no husband present)	19.2%
Number of children enrolled in school	1983
Median age	30.1
Percent of population over 65 years of age	8.3%
Percent high school graduates among adults over 25	77.8%
Number of car poolers in area	550
Average travel time to work	22.3 Min.
Percent unemployed	7.3%
1979 Average household income	$20995
Percent of families below the poverty level	9.6%
Percent of housing units owner occupied	88.9%
Number of vacant housing units for sale	40
Median price asked for units for sale	$63100
Median monthly mortgage costs	$369
Number of vacant housing units for rent	10

Median monthly gross rent	$318

Number of housing units built:

1979-1980	0
1975-1979	7
1970-1974	34
1960-1969	50
1950-1959	324
1940-1949	612
1939 or before	1165

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: near Washington Park; Census tract 29.02
Boundaries: West - Pearl; North - E. Alameda; East - Downing St.; South - I-25

1980 characteristics:

Number of people	4118
Number of households	1974
Average number of people per household	2.09
Percent married couple families	40%
Percent female headed families (no husband present)	9.8%
Number of children enrolled in school	707
Median age	31.8
Percent of population over 65 years of age	16.9%
Percent high school graduates among adults over 25	81.7%
Number of car poolers in area	410
Average travel time to work	19.1 Min.
Percent unemployed	5.1%
1979 Average household income	$19771
Percent of families below the poverty level	2.0%
Percent of housing units owner occupied	63.5%
Number of vacant housing units for sale	14
Median price asked for units for sale	$79200
Median monthly mortgage costs	$412
Number of vacant housing units for rent	30
Median monthly gross rent	$298

Number of housing units built:

1979-1980	7
1975-1979	36
1970-1974	21
1960-1969	54
1950-1959	113
1940-1949	150
1939 or before	1648

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

DENVER DISASTER: RELOCATION OF FORCED MOVERS

Neighborhood Table

General area: Downtown; Census tract 17.02
Boundaries: West - Cherry Creek; Northwest - Lawrence St.; Northeast - 20th St.; East - Broadway; South - West Colfax

1980 characteristics:	
Number of people	2030
Number of households	1631
Average number of people per household	1.2
Percent married couple families	9%
Percent female headed families (no husband present)	1.8%
Number of children enrolled in school	72
Median age 52.0	
Percent of population over 65 years of age	26.2%
Percent high school graduates among adults over 25	60.8%
Number of car poolers in area	90
Average travel time to work	14.9 Min.
Percent unemployed	7.9%
1979 Average household income	$11930
Percent of families below the poverty level	13.7%
Percent of housing units owner occupied	.7%
Number of vacant housing units for sale	6
Median price asked for units for sale	$78800
Median monthly mortgage costs	n.a.
Number of vacant housing units for rent	465
Median monthly gross rent	$134

Number of housing units built:	
1979-1980	46
1975-1979	108
1970-1974	159
1960-1969	292
1950-1959	22
1940-1949	25
1939 or before	1501

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: West Denver; Census tract 45.01
Boundaries: West - Denver/Jefferson County line; North - W. Alameda Ave.; East - Perry; South - West Mississippi

1980 characteristics:	
Number of people	5683
Number of households	1982
Average number of people per household	2.87
Percent married couple families	57.6%
Percent female headed families (no husband present)	12.4%
Number of children enrolled in school	1469

Median age	26.0
Percent of population over 65 years of age	6.9%
Percent high school graduates among adults over 25	52.2%
Number of car poolers in area	679
Average travel time to work	23.1 Min.
Percent unemployed	6.1%
1979 Average household income	$18134
Percent of families below the poverty level	12.0%
Percent of housing units owner occupied	60.0%
Number of vacant housing units for sale	26
Median price asked for units for sale	$46300
Median monthly mortgage costs	$338
Number of vacant housing units for rent	54
Median monthly gross rent	$294

Number of housing units built:

1979-1980	14
1975-1979	36
1970-1974	154
1960-1969	304
1950-1959	1010
1940-1949	379
1939 or before	191

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Lakewood; Census tract 112.02

Boundaries: West - Kipling St.; North - U. S. Highway 6; East - Wadsworth; South - West Alameda Ave.

1980 characteristics:

Number of people	4706
Number of households	1684
Average number of people per household	2.79
Percent married couple families	70.4%
Percent female headed families (no husband present)	8.1%
Number of children enrolled in school	1330
Median age	33.9
Percent of population over 65 years of age	8.4%
Percent high school graduates among adults over 25	89.2%
Number of car poolers in area	374
Average travel time to work	20.9 Min.
Percent unemployed	4.5%
1979 Average household income	$29853
Percent of families below the poverty level	2.8%
Percent of housing units owner occupied	79.4%
Number of vacant housing units for sale	23
Median price asked for units for sale	$73100
Median monthly mortgage costs	$351
Number of vacant housing units for rent	34
Median monthly gross rent	$353

Number of housing units built:

1979-1980	18
1975-1979	73
1970-1974	112
1960-1969	242
1950-1959	1076
1940-1949	155
1939 or before	83

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Aurora; Census tract 70.03
Boundaries: West - Parker Rd.; North - E. Hampden; East - S. Himalaya; South - Quincy Ave.

1980 characteristics:

Number of people	4690
Number of households	1469
Average number of people per household	3.19
Percent married couple families	79.2%
Percent female headed families (no husband present)	5.3%
Number of children enrolled in school	1680
Median age	32.5
Percent of population over 65 years of age	3.3%
Percent high school graduates among adults over 25	93.7%
Number of car poolers in area	407
Average travel time to work	19.1 Min.
Percent unemployed	3.1%
1979 Average household income	$36078
Percent of families below the poverty level	2.6%
Percent of housing units owner occupied	84%
Number of vacant housing units for sale	15
Median price asked for units for sale	$87000
Median monthly mortgage costs	$519
Number of vacant housing units for rent	4
Median monthly gross rent	$287

Number of housing units built:

1979-1980	12
1975-1979	138
1970-1974	803
1960-1969	499
1950-1959	28
1940-1949	5
1939 or before	3

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Arapahoe County adjacent to Cherry Hills Village; Census tract 40.04
Boundaries: West - Cherry Hills Village boundary; North - Hampden Rd.; East - 125; South - E. Quincy Ave.

1980 characteristics:	
Number of people	1880
Number of households	814
Average number of people per household	2.3
Percent married couple families	70.5%
Percent female headed families (no husband present)	7.1%
Number of children enrolled in school	362
Median age 49.0	
Percent of population over 65 years of age	12%
Percent high school graduates among adults over 25	97.3%
Number of car poolers in area	97
Average travel time to work	21.1 Min.
Percent unemployed	3.6%
1979 Average household income	$45484
Percent of families below the poverty level	0%
Percent of housing units owner occupied	89.3%
Number of vacant housing units for sale	15
Median price asked for units for sale	$77500
Median monthly mortgage costs	$447
Number of vacant housing units for rent	22
Median monthly gross rent	$526

Number of housing units built:	
1979-1980	8
1975-1979	22
1970-1974	102
1960-1969	458
1950-1959	234
1940-1949	6
1939 or before	0

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Jefferson County; Census tract 120.07
Boundaries: West - U. S. Highway 285 to Turkey Creek to Dear Creek Canyon Rd; North - U. S. Highway 285; East - crest of hogback; South - Deer Creek Canyon Rd.

1980 characteristics:	
Number of people	1218
Number of households	378
Average number of people per household	3.22
Percent married couple families	81.2%
Percent female headed families (no husband present)	2.4%
Number of children enrolled in school	445
Median age 31.0	

Percent of population over 65 years of age	2.5%
Percent high school graduates among adults over 25	92.3%
Number of car poolers in area	85
Average travel time to work	29.1 Min.
Percent unemployed	2.1%
1979 Average household income	$53484
Percent of families below the poverty level	0
Percent of housing units owner occupied	86.2%
Number of vacant housing units for sale	20
Median price asked for units for sale	$200000
Median monthly mortgage costs	$758
Number of vacant housing units for rent	0
Median monthly gross rent	$211

Number of housing units built:

1979-1980	72
1975-1979	140
1970-1974	54
1960-1969	39
1950-1959	25
1940-1949	32
1939 or before	50

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Neighborhood Table

General area: Evergreen; Census tract 98.09
Boundaries: West - Clear Creek/Jefferson County line; North - Clear Creek to where it joins with Beaver Brook, up Beaver Brook to 170 intersection. 170 to Cold Spring Gulch to intersection with State Highway 74.

1980 characteristics:

Number of people	5231
Number of households	1724
Average number of people per household	3.03
Percent married couple families	73.2%
Percent female headed families (no husband present)	4.8%
Number of children enrolled in school	1840
Median age 31.4	
Percent of population over 65 years of age	3.9%
Percent high school graduates among adults over 25	94.9%
Number of car poolers in area	604
Average travel time to work	29.9 Min.
Percent unemployed	5.7%
1979 Average household income	$41822
Percent of families below the poverty level	2.9%
Percent of housing units owner occupied	81.7%
Number of vacant housing units for sale	73
Median price asked for units for sale	$164700
Median monthly mortgage costs	$697
Number of vacant housing units for rent	10
Median monthly gross rent	$329

Number of housing units built

1979-1980	125
1975-1979	487
1970-1974	319
1960-1969	426
1950-1959	190
1940-1949	196
1939 or before	144

See the Census tract map and the Denver City street map; these data are derived from the 1980 Census of Population and Housing for the Denver-Boulder Metropolitan Area.

Selected Denver Housing Location Information

Some of the publicly and privately owned reasonable cost housing in the Denver Metropolitan Area. Taken from a publication of the U.S. Department of Housing and Urban Development (Grady Franklin Maples, Regional Administrator) entitled "A HUD Helper"

Corona Residences (Elderly) 1445 Corona
Drehmoor Apartments (Elderly) 215 East 19th Avenue
Fairview Apartments (Family) 14594 East Mississippi
Franconia Apartments (Elderly) 930 Downing
Green Ridge Meadows (Family) 2985 Colorado Hwy. 74
Liggins Tower (Elderly) 5150 East 34th Avenue
Metro Manor (Elderly) 1523 Quitman
Pine Apartments (Family) 824 East 20th
Sakura Square (Elderly) 1255 19th St.
Sheridan Apartments (Family) 948 South Sheridan
Skyline Park (Elderly) 1535 Arapahoe
Sunset Park (Elderly and Family) 1865 Larimer
Sunset Towers (Elderly and Handicapped) 1925 Larimer
Tiffany Square (Family) 935 Sheridan Boulevard

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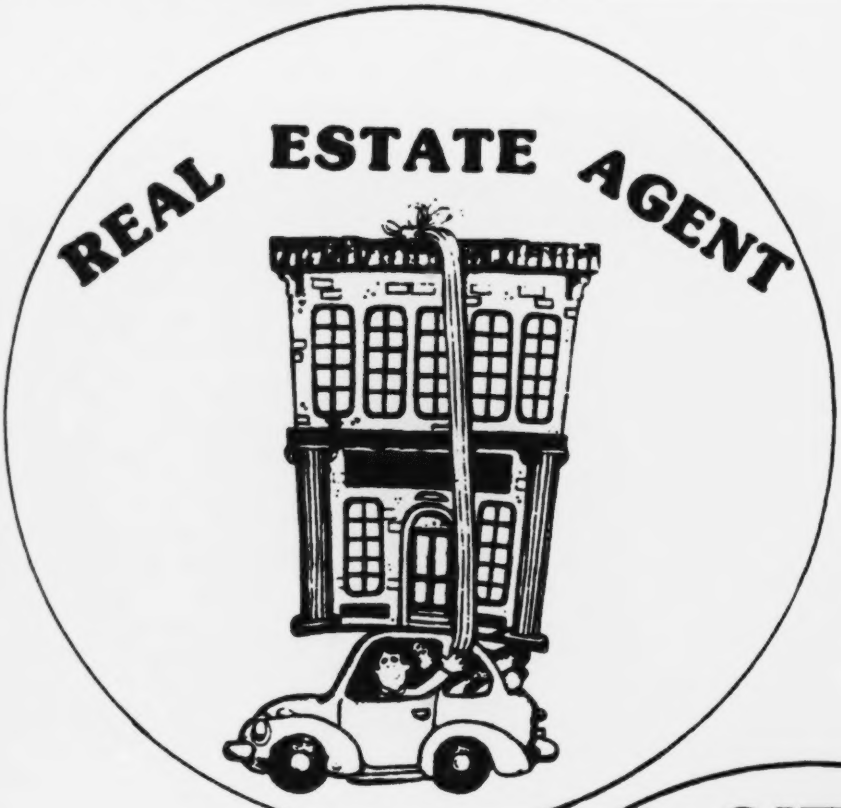
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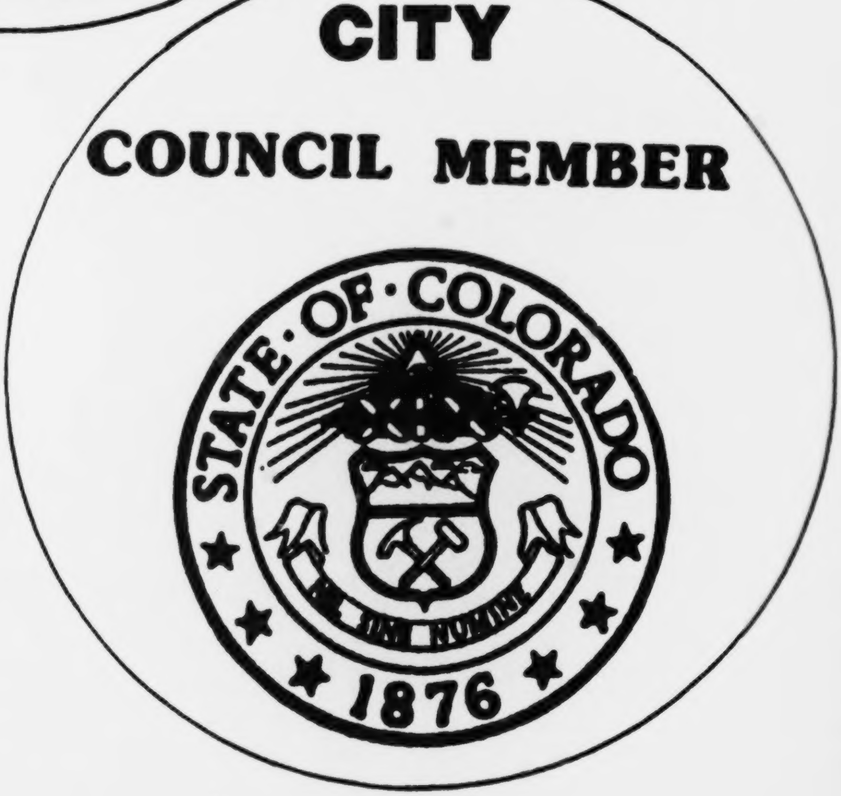
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STATE · OF · COLORADO
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1876

EPA

CULTURAL CONVERGENCE: THE USSR AND THE USA

SENIOR HIGH

It is imperative that American high school students understand the basic geography of the USSR. (A brief survey of the regions of the USSR is attached to this lesson.) Limiting such knowledge to college students will serve to produce more people who see only the shadows of the dancing bear on the cave walls. Comparison of the two countries—the USSR and the USA—by use of the convergence concept will help dispel some of the myths.

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Why Study USSR/USA Convergence? Plato's Cave with Bear and Eagle shadows

The Union of Soviet Socialist Republics (USSR) is the largest country in the world with the third largest population and the third largest economy. It provides ideological leadership for much of the socialist world. In the USA, myths abound about the USSR and vise versa. This is analogous to Plato's famous cave in which people chained in a cave can only see the shadows made by a fire at the cave entrance and they believe those shadows to be reality. Only after becoming unchained can they look at the fire and see it as reality. In the USA, our image of the Soviet bear is such a shadow just as is the Soviet image of the American eagle.

Yet, Industrial societies break down traditional folk cultures. A world wide popular culture is rapidly emerging regardless of individual countries' ideologies and histories. The USSR and the USA are both subject to this convergence of cultures. Clark Kerr has analyzed this process (Fig. 1). High school geography students should learn about cultural similarities resulting from this convergence in order to dispel mythological shadows about the USSR.

Both the USSR and the USA are 20th century industrial giants that evolved from 19th century territorial expansion over adjacent lands—Siberia/Central Asia and the Mountain/Plateau American West. Both nations now face problems of pollution of the environment, long distance transportation, allocation of finite resources, aging populations, urban growth, and world leadership roles.

Discovering Similarities between the USSR and the USA

Purpose

This activity utilizes two Soviet publications, Soviet Life and Soviet Union, to explore similarities in the USSR and the USA that have resulted from cultural convergence. The map poster by the National Geographic Society entitled Maps, the Landscape, and Fundamental Themes in Geography is used. Colors for the place markers used in the exercise are coordinated with those of the five themes of the NGS map.

Procedures

1. Each team (2 or 3 persons) receives a Soviet Life or a Soviet Union magazine (or one of each, if available) and a set of five place markers. These markers contain questions relevant to the five fundamental themes in geography; location, place, human-environment interaction, movement, and region.

Current Comparability
Rates of economic growth

Social welfare productivity in terms of
life expectancy and
and levels of literacy
manufacturing
enterprises
Existence of substantial
numbers of professionals
and technicians in labor
force
Increased occupational
and geographic mobility
Creation of a "web of
rules" governing the
workplace
Hours of work per week
Length of working life
Use of nonworking time
Net reproduction rate
Wage differentials for
skill
Prestige scores for
occupations
Interindustry wage
differentials
Welfare expenditures
as percent of GNP
Government expenditures as percent of GNP

Increasing Similarity
Percent of population
in agriculture
Percent of adult
women in labor force
Percent of labor force
in service and white-
to dismiss workers
Content of work rules
Distribution of income
Use of property

Continuing Substantial Dissimilarity
Level of income per
employed worker
Percent of GNP expended
for investment
Percent of students in
higher education enrolled
pay for white-collar
workers
Percent of national
income spent on current
consumption
Amount of acknowledged inflation
Amount of open
unemployment
Ownership of property
Use of plans and markets

Autonomy of organizations of workers (except
for Yugoslavia
among the socialist
nations)
Distribution of ultimate
political power
Religious beliefs, national
and ethnic identities
and personality
traits and behavior
Goals of economic and
political systems

Figure 1. Evidence On Convergence and Continuing Diversity between Capitalist and Socialist Nations

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*Source: Clark Kerr. 1983. The Future of Industrial Societies: Convergence or Continuing Diversity Cambridge: Harvard University Press, p. 47.

2. Team members collectively examine the contents of the magazine in search of examples to illustrate the theme questions, write down their choices on the markers, and put the place marker at the appropriate page in the magazine.
3. Team members share their evidence in group/class discussion that should focus both on USSR/USA similarities as a result of cultural convergence and basic knowledge of the geography of the USSR in terms of the five fundamental themes.

Materials

Both Soviet Life and Soviet Union can be easily ordered for school libraries at modest subscription costs. If, however, they are not available other magazines can easily be used. For example, a National Geographic with a Soviet topic, Time with a Soviet feature story, the Christian Science Monitor with a Soviet feature story, or any other journal with a photo oriented presentation on the USSR.

Soviet Life is published by the Soviet government in the United States as part of the 1964 Cultural Exchange agreement between the USA and the USSR. Soviet Life can be ordered by writing to the magazine at: 1706 18th Street, Washington, D.C. 20009. Renewed subscriptions are $12.00 per year.

Soviet Union is published in many languages by the Soviet government and is aimed primarily at readership in Third World Countries. Write to the Special Order Department, EDSCO Industries Inc., P.O. Box 522, Birmingham, Alabama 35201. Be sure that you indicate you are ordering Soviet Union, since EBSCO handles accounts for many foreign journals.

Other useful supplement textbooks to include:

Larry Cuban and Eugene Dunlop. Soviet Union. Scott Foresman Spectra Program: People of the World, 1975.

Educational Masterprints Company. Soviet Union. Box 221, Garden City, New York 11530.

Scholastic Book Services. The Soviet Union and Eastern Europe, 1980.

Wesley M. Shoemaker. The Soviet Union and Eastern Europe. Stryker-Post Publications: The World Today Series, Harpers Ferry, West Virginia 25425, 1983.

Time-Life Books. The Soviet Union. 1985. The Library of Nations Series.

Regions of the USSR: A Geographical Almanac

The USSR is a collection of 15 soviet republics. Although the whole country is often called Russia (reminiscent of pre-1917 Russian Empire days), only about half of the population is Russian. An understanding of this huge (one-sixth of the earth) multinational state must include some knowledge of the regions within it. The accompanying map and the text below summarize these regions.

European USSR Core Regions

Central Industrial Region (in recent Five-Year Plans, the Central Economic Region)

Size: about 100,000 sq. mi. (Colorado)

Population: about 25 million (California). Chief cities are Moscow and Gorky.

Ethnic make-up: Dominantly Russian, but many minorities have migrated to the capital

Functions: Political rule, economic and cultural leadership, manufacturing consumer goods

North American Physical equivalent: Edmonton and northern Alberta

North American Cultural equivalent: New York-Washington Corridor (Megalopolis)

Ukrania (Ukraine SSR and adjacent Moldavia SSR and lower Don and Kuban Valleys of Russia)

Size: about 250,000 sq. mi. (Texas)

Population: about 65 million (East and West Germany). Chief cities are Kiev, Karkov, and Odessa

Ethnic make-up: Dominantly Ukrainian but Moldavians (Rumanians) and Russians are numerous.

Functions: Breadbasket and steel belt, Russian Riviera in Crimea

North American Physical equivalent: Montana, North and South Dakota and southern parts of Alberta, Saskatchewan and Manitoba

North American Cultural equivalent: American Midwest and Great Lakes Region

Povolzhye (Region along the Volga, frontier turned industrial)

Size: about 250,000 sq. mi. (Texas)

Population: about 30 million (California plus Oregon and Washington).
Chief cities are Kazan and Volgograd

Ethnic make-up: East meets West: Russians, Tatars, Kalmyks, etc. Germans prior to World War II.

Functions: Marginal breadbasket, new heavy industry, cars and trucks, oil and natural gas

North American physical equivalent: Saskatchewan River Valley

North American cultural equivalent: Mississippi River Valley

European USSR Fringe Regions

Caucasia (Georgian, Armenian and Azerbaydzhanian SSRs and adjacent parts of Russian SSR)

Size: about 172,000 sq. mi. (larger than California)

Population: about 25 million (California). Chief cities are Tblisi and Baku

Ethnic make-up: The three national groups of SSRs and many smaller groups; few Russians

Functions: Petroleum products, sub-tropical crops, Riviera tourism

North American physical equivalent: California

North American cultural equivalent: California

Baltica (Byelorussian, Estonian, Latvian, Lithuanian SSRs and adjacent parts of Russian SSR)

Size: about 300,000 sq. mi. (Texas and Oklahoma)

Population: about 27 million (New York state and New England). Chief cities are Leningrad, Riga, and Nin

Ethnic make-up: Baltic peoples, Byelorussians (Slavs) and Russians

Functions: Window to the West, flax, dairy products, fish, high tech industry

North American physical equivalent: Anchorage and southern Alaska

North American cultural equivalent: Boston/New England (or maybe San Francisco/Ecotopia)

Arctica

Size: about 600,000 sq. mi. (Alaska)

Population: about 6 million (Michigan). Chief cities are Murmansk and Archangel

Ethnic make-up: Russians, Karelians (related to Finns), and native Komi, Lapps, etc.

North American physical equivalent: Alaska and the Yukon.

North American cultural equivalent: Alaska and the Yukon.

Functions: Fish, wood products, port facilities, coal, iron, aluminum ore

Asian USSR Regions

Urals-West Siberia New Core Region (Includes northern Kazakh SSR)

Size: 2.1 million sq. mi. (U.S. west of the Mississippi)

Population: 43 million (California and New York)—Chief cities are Perm, Sverdlovsk, and Novosibirsk

Ethnic make-up: Mostly Russians and Ukrainians, some surviving World War II refugees and natives

Functions: Marginal breadbasket, abundant oil, natural gas, timber, and metals in the Urals

North American physical equivalent: Canada east of the Rockies

North American cultural equivalent: Mountain-Plateau West of the U.S.

Central Asian Fringe Region (Includes southern Kazakh SSR)

Size: 1 million sq. mi. (Alaska-Texas-California)

Population: 25 million (California). Chief cities are Tashkent and Alma Ata

Ethnic make-up: Turkic groups: Kazakhs, Uzbeks, Kirghiz, numerous Russians, and World Wadr II refugees

Functions: Cotton, sub-tropical crops, Cape Canaveral, some minerals

North American physical equivalent: Utah-Idaho

North American cultural equivalent: Arizona-New Mexico

Eastern Siberian Fringe Region (1.2 million sq. mi. Yakut area transferred to Far East in last 5-Year Plan—to lure Japanese investment)

Size: 1.1 million sq. mi. (Alaska-Texas-California)

Population: 10 million (Illinois)—Chief city is Irkutsk

Ethnic Make-up: Mostly Russian with Buryats and other surviving natives

Functions: Timber, furs, hydro power, nickel, and huge coal reserves

North American physical equivalent: Canada north of the Great Lakes

North American cultural equivalent: Canada north of the Great Lakes

Far East Fringe Region (Much enlarged with Yakut ASSR)

Size: 2.5 million sq. mi. (U.S. west of Appalachians)

Population: 7 million (Colorado-Nebraska-Kansas). Chief cities are Khabarovsk and Vladivostok

Ethnic make-up: Mostly Russians and Ukrainians with some surviving natives

Functions: Fish and ports, coal, oil, furs, and firs (timber)

North American physical equivalent: Alaska and Northern Canada

North American cultural equivalent: Alaska and Northern Canada

Location Theme

A. Absolute Location: On a grid system, (latitude and longitude), where is the article's main subject located?

Example: Where is Kiev?

Your example of absolute location for the article.

____

____

____

____

B. Relative Location: Where is a place compared to other places?

Example: Where is Yakutsk located compared to the Ural Mountains?

Your example of relative location from your article.

____

____

____

____

Place Theme

What physical and human characteristics make the place featured in the article different from other places? Example: Describe physical characteristics of the Kola Peninsula and the Berents Sea and characteristics of human development which make Murmansk a unique place.

Your example of place from the article.

____

____

____

Human-Environment Interaction Theme

(Relationships within places)

This theme examines how human-environment interactions develop and what the consequences are for people and landscapes. Example: How have Soviets changed the environment in Kazakhstan to grow rice and corn? Why have they made these changes in resource use? What are the consequences of these changes?

Your example of human-environment interaction from articles.

____

____

____

Movement Theme

This theme illustrates mobility of people, goods, and ideas: people interacting.

Example: How is over 30 % of the freight conveyed from Gorky, Togliatti, and Volgagrad?

Your example of movement from your article.

____

____

____

Regions Theme

Regions are areas defined by unifying characteristics, either physical or human or both.

Example: Identify the region known as the "breadbasket of the USSR." What are the characteristics that make it unique?

Your example of region from the article.

____

____

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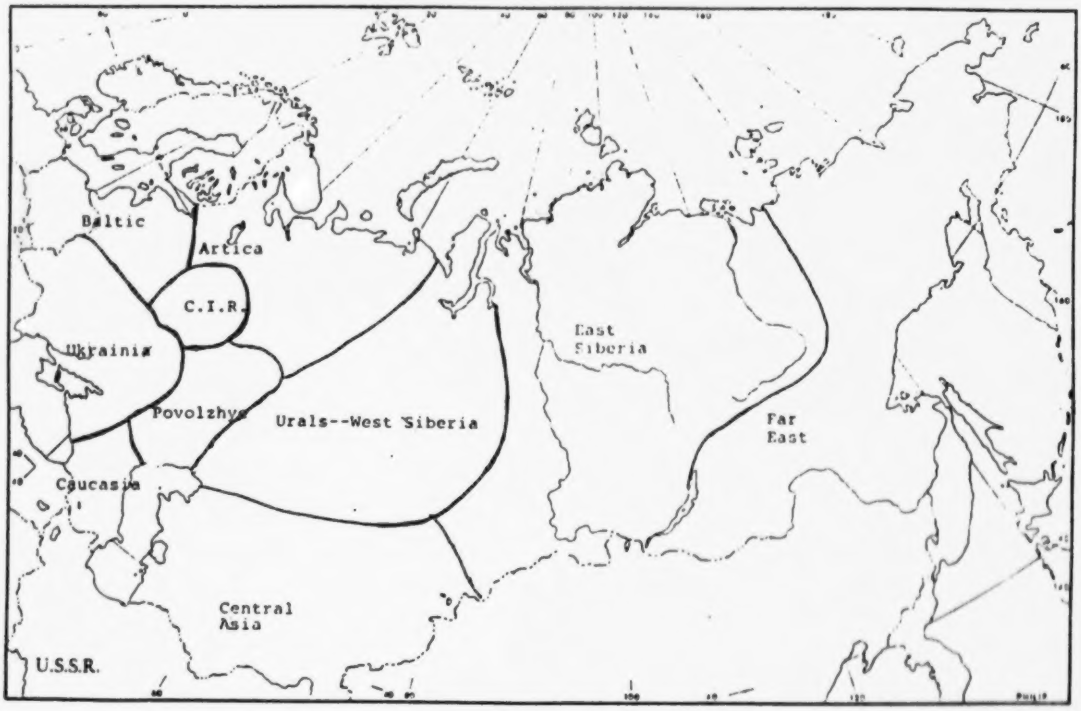

Baltic
Artica
C.I.R.
Ukrainia
Povolzhye
Urals--West Siberia
East Siberia
Far East
Caucasia
Central Asia
U.S.S.R.

CITIES OF THE WEST, OF AMERICA AND OF THE WORLD

SENIOR HIGH

This module examines the city in three different contexts: as a complex social and economic phenomenon or as a component within the national system of cities; and as an economic cog within the world economy. We use Denver as our example, although many other cities would serve—San Francisco, Phoenix, LA, Houston, and Oklahoma City have all been the objects of scrutiny by geographers, political scientists, and sociologists.

Andrew Kirby
Department of Geography
University of Colorado, Boulder

1. Examining the city as an economic and social unit, we find that it is complex and multi-dimensional. What we recognize as a city is in fact a collection of many competing political units with a single urbanized area (Fig. 1).

2. We can think of the city as a device to create economic, social, and political units that allow households of different incomes, different races, different sexual preferences to locate themselves in a jurisdiction closest to their tastes and budgets. NOTE: this is really only a device to help us think through these processes, and is not really a very close description of reality.

3. The most consistent dimension of these changes has been a centrifugal growth of economies and residential areas at the expense of the old, established central business district (CBD). This is revealed in terms of the falling share of Denver employment vs. the rest of the Standard Metropolitan Statistical Area SMSA (Fig. 2). NOTE: more recent statistics will show some renaissance of Denver's CBD, which can be an interesting topic for class discussion on "yuppification."

4. The falling share of wealth in the central city leads to concentrations of relative deprivation in the latter (Fig. 3). It would be interesting to recompute these data to identify more recent changes.

5. The 'economic frontier' remains on the city margins, be it in terms of retailing (Fig. 4); or in terms of office development (Fig. 5).

6. The constant shifts in economic focus also lead to complex political struggles between jurisdictions for revenue, tax dollars, and space (Fig. 6).

7. We cannot examine the city in isolation. It is also part of a complex system of cities throughout the U.S.A. Investment and labor are both mobile and move from city to city, with the result that there are clear patterns of regional growth and decline. Denver is part of this competitive process, and has grown relatively rapidly, although not as fast as other cities outside the "rustbelt" (Fig. 7). NOTE: We might ask why Denver has not been as successful in attracting growth as other cities; is this deliberate or a failure of marketing?

8. Cities sell themselves as growth machines, a process that can be examined in many ways. Part of it involves the creation of an urban image, which can be anything from a tourist quarter (New Orleans) to an exciting skyline (Houston). Certain attributes are important to this expansion: a major regional airport (hence the urgency of expanding Stapleton), a large amount of hotel spaces (which Denver does not yet have), and office space (which Denver has in overabundance).

9. There are many indicators for comparing urban progress: the popularity of city lists is indicative of this. The Rand-McNally index involves all kinds of measures, from health-care costs to pollution. Others are much simpler, such as the possession of a franchised sports team. To some, Denver will not be a top-rank city until it possesses a baseball team, and a good football team (i.e. one that wins occasionally).

10. Comparing city scores can sometimes have a darker side. In the 1970s, default was common in snowbelt cities; in the 1980s, bond ratings are important. Other variables are also important. Many growth cities have problems that were unforeseen and are only slowly being managed, such as the number of AIDS cases (Fig. 8), or the existence of drug dependent populations.

11. In concluding this multifaceted view of the city, we must also bear in mind that urban areas are tied into, and are important components of, the world economy. Although we are used to thinking about cities like New York and Los Angeles in this role, smaller cities like Denver also have linkages to the world economy. Two simple examples will suffice. Note in Figure 9 the way in which housing starts in Denver is tied into global economic conditions, such as the hike in oil prices in 1974. Nor should we forget that international investment is now truly global. Look at the presence of transnational banks with offices in the city (Fig. 10).

12. Conclusions: The city is an exciting place to take field classes, to look at the demolition and the building. It is also a place with racial and ethnic rivalries and political conflicts. Bear in mind too that the city is not just an arena in which we can examine these "problems." It is a window to a wider world, a world in which capital and people move long distances within the country or even between countries.

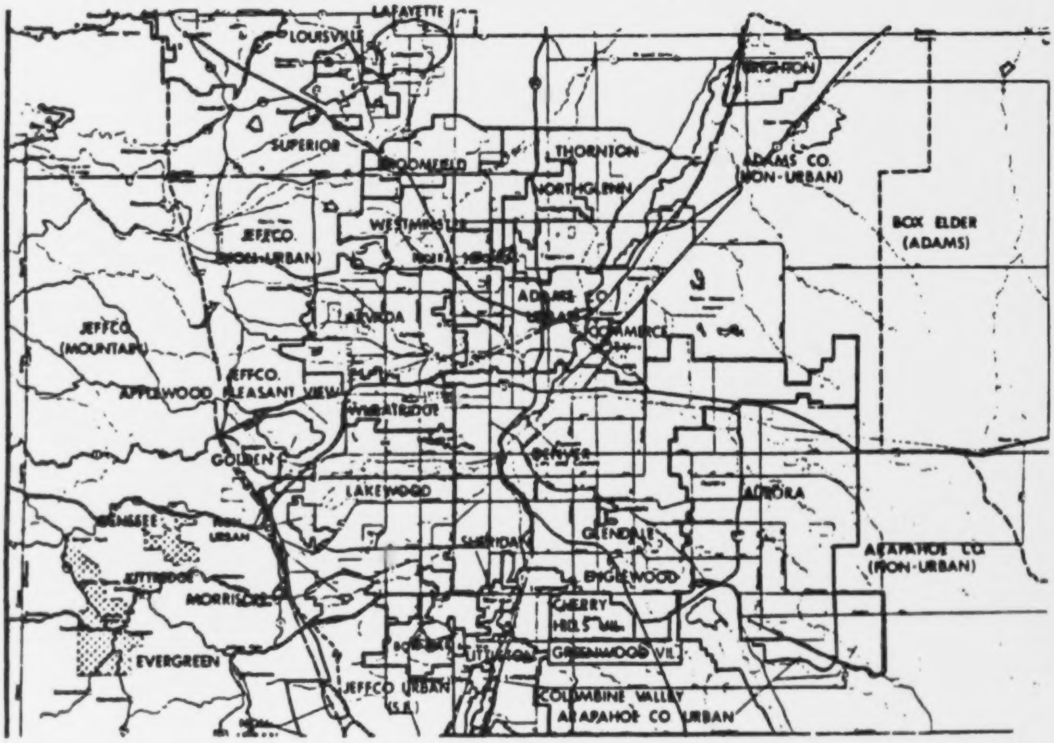

LAFAYETTE
LOUISVILLE
BRIGHTON
SUPERIOR
BROOMFIELD
THORNTON
NORTHGLENN
ADAMS CO.
(NON-URBAN)
BOX ELDER
(ADAMS)
WESTMINSTER
JEFFCO.
(NON-URBAN)
ADAMS CO.
ARVADA
COMMERCE
JEFFCO
(MOUNTAIN)
JEFFCO.
APPLEWOOD
PLEASANT VIEW
WHEATRIDGE
GOLDEN
DENVER
LAKEWOOD
AURORA
GENESEE
NON-URBAN
SHERIDAN
GLENDALE
ARAPAHOE CO.
(NON-URBAN)
KITTREDGE
MORRISON
ENGLEWOOD
CHERRY
HILLS VIL.
EVERGREEN
LITTLETON
GREENWOOD VIL.
JEFFCO URBAN
(S.E.)
COLUMBINE VALLEY
ARAPAHOE CO URBAN

Figure 1

Denver City Share of Denver SMSA Employment, 1958–1977

Employment Sector	*1958 Percentage*	*1967 Percentage*	*1972 Percentage*	*1977 Percentage*
Retailing	73.9	57.1	44.7	37.9
Manufacturing	67.2	54.6	47.8	NA
Selected Services	81.9	71.2	67.3	58.2

SOURCE: William G. Colman, ed., *Suburbs and States: Governing and Financing Urban America* (New York: Free Press, 1975), pp. 58–59, and the sources cited therein. For 1977 figures: U.S. Bureau of the Census, *Employment and Population Changes—Standard Statistical Areas and Central Cities.*

Figure 2

Differences between Denver and Its Suburbs, 1950–70

		Decennial Census Year		
Socioeconomic Characteristics		*1950*	*1960*	*1970*
Educational Attainment:				
% with 13 or more years education in:	*Denver*	23.6	25.8	29.5
	suburbs	19.6	28.9	35.1
Difference, Denver vs. suburbs:		+ 4.0	− 3.1	− 5.6
Occupational status:				
% Professional or Managerial in:	*Denver*	25.2	23.7	27.3
	suburbs	21.0	27.7	31.2
Difference, Denver vs. suburbs:		+ 3.8	− 4.0	− 3.9
Income:				
% Families below $6,000 per year in:	*Denver*	78.8	45.7	24.5
	suburbs	85.8	40.5	14.5
Difference, Denver vs. suburbs: (+ means Denver better off)		+ 7.0	− 4.8	−10.0

SOURCE: U.S. Bureau of the Census, *1950 Census of Population, Colorado*, Vol. 1, Part 7, Tables 30–43; *1960 Census of Population, Colorado*, Vol. 1, Part 7, Tables 20–30; *1970 Census of Population, Colorado*, Vol. 1, Part 7, Tables 120–33.

Figure 3

NEW RETAIL CENTERS IN THE DENVER AREA: MORE OPENINGS FOR SECOND HALF OF 1985

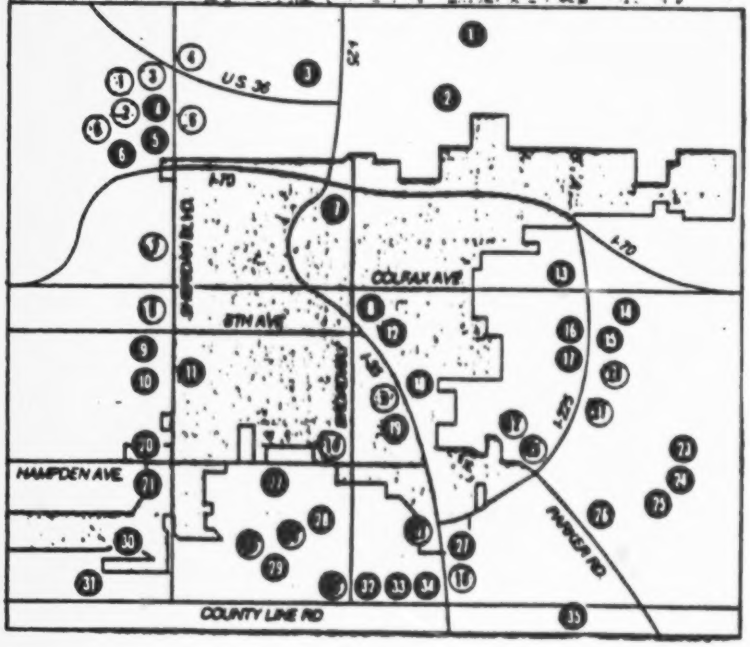
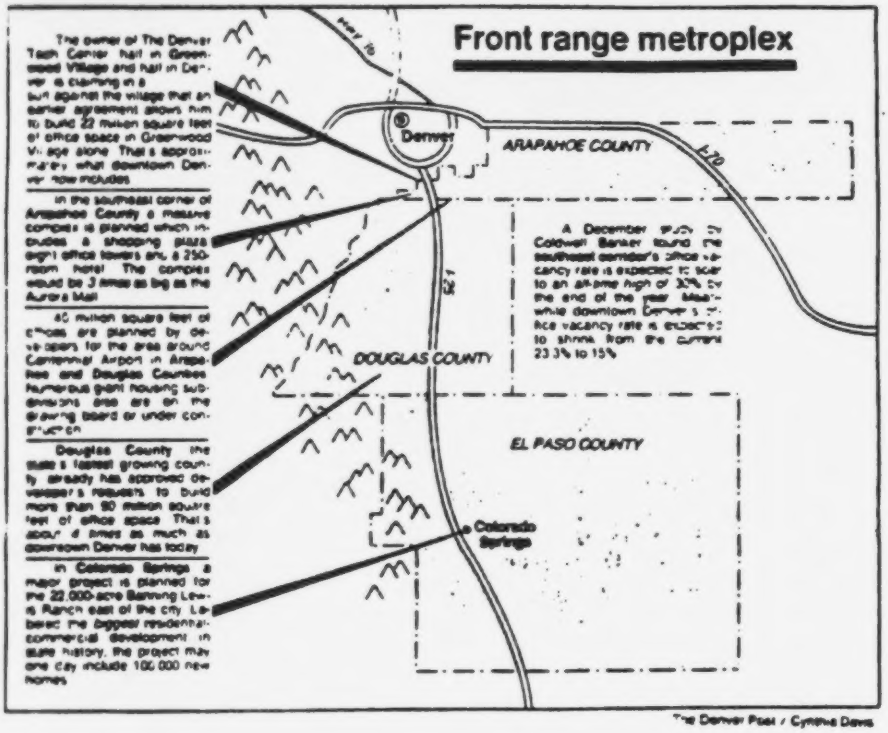


Figure 4


Front range metroplex
Denver
I-70
25
ARAPAHOE COUNTY
DOUGLAS COUNTY
EL PASO COUNTY
Colorado Springs

The owner of The Denver Tech Center, half in Greenwood Village and half in Denver, is claiming in a suit against the village that an earlier agreement allows him to build 22 million square feet of office space in Greenwood Village alone. That's approximately what downtown Denver now includes.

In the southeast corner of Arapahoe County a massive complex is planned which includes a shopping plaza, eight office towers and a 250-room hotel. The complex would be 3 times as big as the Aurora Mall.

40 million square feet of offices are planned by developers for the area around Centennial Airport in Arapahoe and Douglas Counties. Numerous giant housing subdivisions also are on the drawing board or under construction.

Douglas County, the state's fastest growing county, already has approved developer's requests to build more than 90 million square feet of office space. That's about 4 times as much as downtown Denver has today.

In Colorado Springs, a major project is planned for the 22,000-acre Banning Lewis Ranch east of the city. Labeled the biggest residential-commercial development in state history, the project may one day include 100,000 new homes.

A December study by Coldwell Banker found the southeast corridor's office vacancy rate is expected to soar to an all-time high of 30% by the end of the year. Meanwhile downtown Denver's office vacancy rate is expected to shrink from the current 23.3% to 15%.

The Denver Post / Cynthia Davis

Figure 5

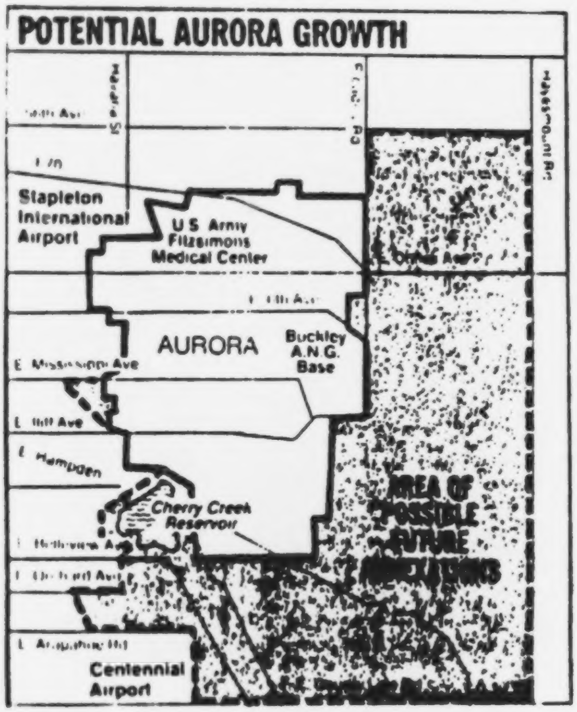
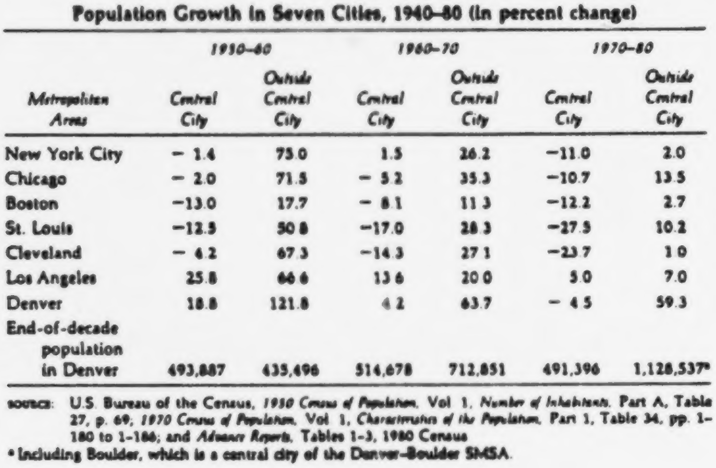

POTENTIAL AURORA GROWTH
I-70
Stapleton International Airport
U.S. Army Fitzsimons Medical Center
AURORA
Buckley A.N.G. Base
E. Mississippi Ave
E. Iliff Ave
E. Hampden
Cherry Creek Reservoir
E. Arapahoe Rd
Centennial Airport
AREA OF POSSIBLE FUTURE ANNEXATIONS

Figure 6



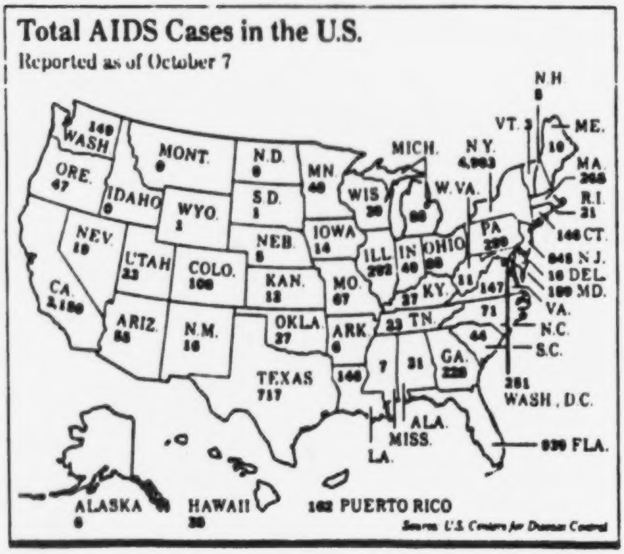
Population Growth in Seven Cities, 1940–80 (in percent change)

	1950–60		*1960–70*		*1970–80*	
Metropolitan Areas	*Central City*	*Outside Central City*	*Central City*	*Outside Central City*	*Central City*	*Outside Central City*
New York City	− 1.4	75.0	1.5	26.2	−11.0	2.0
Chicago	− 2.0	71.5	− 5.2	35.3	−10.7	13.5
Boston	−13.0	17.7	− 8.1	11.3	−12.2	2.7
St. Louis	−12.5	50.8	−17.0	28.3	−27.5	10.2
Cleveland	− 4.2	67.3	−14.3	27.1	−23.7	1.0
Los Angeles	25.8	66.6	13.6	20.0	5.0	7.0
Denver	18.8	121.8	4.2	63.7	− 4.5	59.3
End-of-decade population in Denver	493,887	435,496	514,678	712,851	491,396	1,128,537*

SOURCE: U.S. Bureau of the Census, *1950 Census of Population,* Vol. 1, *Number of Inhabitants,* Part A, Table 27, p. 69; *1970 Census of Population,* Vol. 1, *Characteristics of the Population,* Part 1, Table 34, pp. 1-180 to 1-186; and *Advance Reports,* Tables 1-3, 1980 Census

* Including Boulder, which is a central city of the Denver–Boulder SMSA.

Figure 7



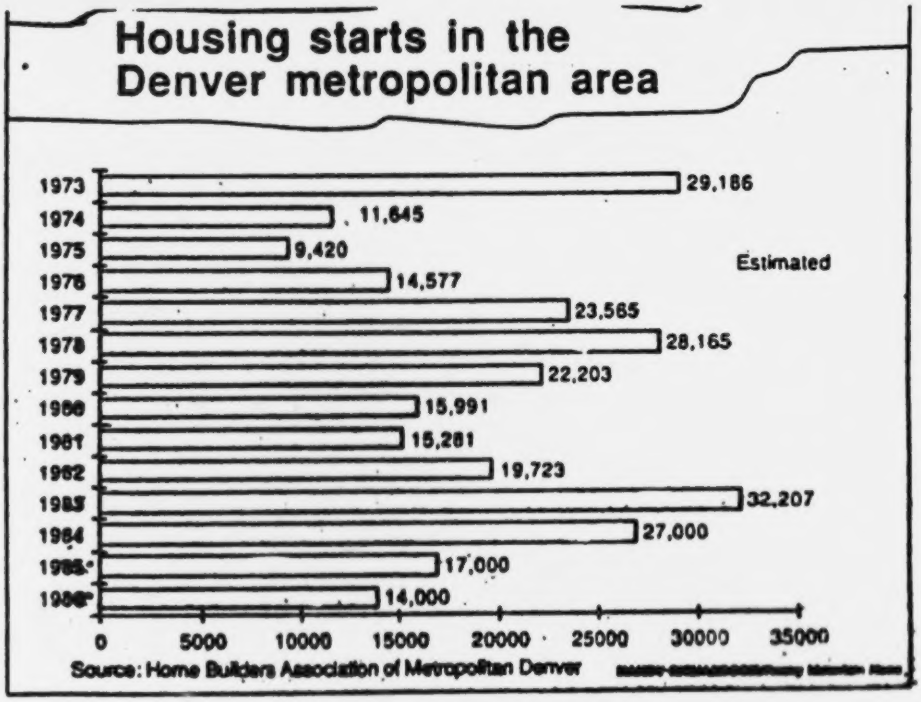
Total AIDS Cases in the U.S.

Reported as of October 7

140 WASH.
MONT. 0
N.D. 0
MN. 40
ORE. 47
IDAHO 0
WYO. 1
S.D. 1
WIS. 30
MICH.
N.Y. 4,903
VT. 3
N.H. 5
ME. 10
MA. 268
R.I. 21
W. VA.
NEV. 19
UTAH 22
COLO. 100
NEB. 5
IOWA 14
ILL. 292
IN 40
OHIO 90
PA 299
140 CT.
848 N.J.
16 DEL.
109 MD.
CA. 2,150
KAN. 13
MO. 67
KY. 27
11
147 VA.
71 N.C.
ARIZ. 55
N.M. 16
OKLA. 27
ARK. 6
23 TN.
44 S.C.
TEXAS 717
140 LA.
7 MISS.
31 ALA.
GA. 220
281 WASH., D.C.
930 FLA.
ALASKA 6
HAWAII 30
162 PUERTO RICO

Source: U.S. Centers for Disease Control

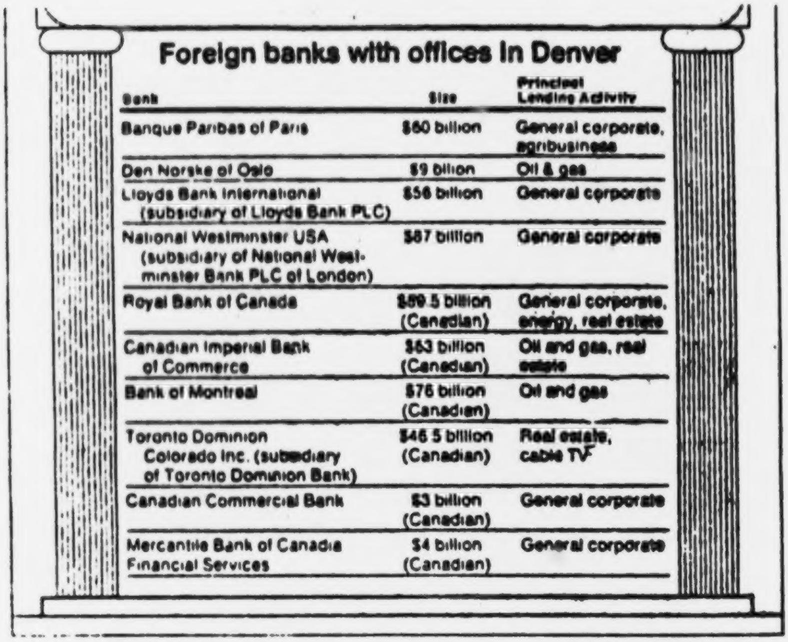
Figure 8



Housing starts in the Denver metropolitan area

Source: Home Builders Association of Metropolitan Denver

Figure 9



Foreign banks with offices in Denver

Bank	Size	Principal Lending Activity
Banque Paribas of Paris	$60 billion	General corporate, agribusiness
Den Norske of Oslo	$9 billion	Oil & gas
Lloyds Bank International (subsidiary of Lloyds Bank PLC)	$56 billion	General corporate
National Westminster USA (subsidiary of National Westminster Bank PLC of London)	$87 billion	General corporate
Royal Bank of Canada	$89.5 billion (Canadian)	General corporate, energy, real estate
Canadian Imperial Bank of Commerce	$63 billion (Canadian)	Oil and gas, real estate
Bank of Montreal	$76 billion (Canadian)	Oil and gas
Toronto Dominion Colorado Inc. (subsidiary of Toronto Dominion Bank)	$46.5 billion (Canadian)	Real estate, cable TV
Canadian Commercial Bank	$3 billion (Canadian)	General corporate
Mercantile Bank of Canada Financial Services	$4 billion (Canadian)	General corporate

The Denver Post [illegible]

Figure 10

LOWER WEST SIDE: A DECISION - MAKING ACTIVITY

SENIORHIGH

Before using this activity in class, students should have some background in the theories of urban morphology and land use (concentric zones, sectors, etc.), as well as the historical-social geography of the city. This background will provide a conceptual framework into which the students will be able to fit the "Lower West Side" scenario. This activity derives from one titled "Redeveloping London's Docklands" by Andrew Kirby. In that guide, the activity was developed from one titled "St. Katherine's Dock-a model for dock and redevelopment" by J. Fien et al., "Classroom Geographer", May 1981.

Peter D. Frank
Chatfield High School
Jefferson County Colorado

1. The city is multi-dimensional, being composed of competing political, economic, and social groups and interests. "L W S" puts students in interests and the consequences of that competition.

2. Core cities, which have for decades suffered from the effects of the centrifugal forces affecting urban growth, have been actively seeking to reverse these tendencies. These recent efforts at "urban renewal" or "revitalization" seek to increase the residential diversity of the core elements of society in the core city (reversing the trend toward concentrating the poorer and minority elements of society in the core city, where they are frequently the majority of the permanent population). Further, renewal schemes are seen as ways for core cities to recapture some of the business and tax revenues which have been escaping to the suburbs.

3. "L W S" will generate consideration of the phenomenon of "gentrification" or "yupification" of parts of core cities. What are the reasons for which some people (yuppies?) would move to a downtown residence? (My own students, who are truly "lost in the "burbs", will have trouble with this!) What are the effects of gentrification? Is it an unalloyed good? What becomes of those who are displaced by the process of renewal? Which voices are heard the loudest in the planning process? Insights into, if not clear cut answers for these questions are our goal in this activity.

4. As geographers, we recognize that a city is a region, an area unified in a functional sense by many characteristics, such as the ebb and flow of commuters, and by the movements of goods and services. Cities are also regions in the sense that they are defined by political boundaries and the extent of built up areas. Theories of urban morphology tell us that we may expect to find, with some regularity, subregions or zones of uniform lad use types and/or social characteristics within cities. As geographers, we seek to understand the forces which lead to change over time in the internal geography of the city. We can understand how an area like the Lower West Side came into being, as well as the forces which may transform it into a new kind of urban region.

While we look for regularities in the nature of cities, we may also analyze them from the perspectives of location and place. Analyzing the site and situation of cities has long been a favorite activity of geographers. Each city has unique characteristics, physical and/or human, which differentiate it, as a place, from all others. Within the city many different locations and places exist. These offer us a limitless opportunity to identify and interpret the interrelations which exist in the urban environment.

Content/Strategies

1. Divide class into groups of five students, each member adopting one of the roles described below. Each student should begin studying his/her role, and from that perspective, begin thinking about how he/she would like to see the Lower West Side developed.

Roles

(These people are residents of the mythical city of Revned. Any resemblance this city or its people bear to reality is all in your mind).

a. Mal Bowen-You are a developer who controls a large and very successful construction firm which has a reputation for building visually appealing, high quality projects. You see Revned's Lower West Side as an opportunity to build a major showcase project. With this project you hope to make a national reputation which will allow you to expand into other cities in other parts of the country. Your intent here is to build the kind of buildings which return high rents- tourist facilities, commercial, and certain types of housing. A constraint is the fact that you must get the approval of the Revned Housing and Development Authority, the body which approves plans and authorizes construction. However, RHDA knows how important you are, since you have the financing to make the project happen.

b. Ms. Denise Champion- You are the spokesperson for the Laramie Plaza Association. This is a group drawn from the rather well off denizens of that part of the city which was once one of its most notorious skid rows, but which now has been renovated into a collection of exclusive townhouses, trendy boutiques, upscale taverns and restaurants, and many kitchenware and home furnishing retailers. Laramie Plaza is adjacent the proposed Lower West Side Project. Your group would like to see the LWS undergo the sorts of changes its area went through. They feel the value of their properties and the quality of their lives would be enhanced by making the LWS "economically viable" (in their vision), and by introducing more parks and open spaces, which their area lacks. Since you are also a realtor, you see the potential for personal profit as well as a better neighbor for your client group.

c. Mr. Smithfield Snare- You are a member of the Revned Housing and Development Authority, an entity which has been granted the power to acquire land and plan for its redevelopment. In an era when both population and dollars are fleeing the city for the suburbs, you see developments like Laramie Plaza and the potential of the Lower West Side Project as ways to reverse the trend. You feel the need to bring money into Revned, but you also want to provide for the people of the city, including the current residents of the Lower West Side. The LWS Project has great business and residential potential due its proximity to downtown and its historical character (if developed properly). The area could also become a tourist attraction with parks, museums, and other cultural edifices oriented toward the Flat River and/or the railroad, the foci of the city in decade gone by. However, you realize that the LWS has in the past provided employment for many people, and is still the residence of a considerable number of Revnedians. Housing and employment for them must be considered in any plan.

d. Mr. Eugene Alome- You are part of the Lower West Side Community Council and have been asked to serve as an advisory member of RHDA. Your involvement stems from the fact that you are the proprietor of "My Grandmother's Pub", a drinking establishment (primarily), the name of which derives from the truth. "My Grandmother's" has existed in one form or another since the turn of the century when your grandmother did operate a cafe/tavern on the site. "My Grandmother's" has been a solid member of the community for decades (witness the dusty trophies behind the bar, and the calendars on the wall, some of which date back to Prohibition). The notion of redevelopment makes you uneasy because, first, ferns make you sneeze, and secondly, you're not sure there will be places for an Alome, his tavern, or the people who patronize his place and who live in the neighborhood, in what is sure to become a high rent district. You feel that Laramie Plaza, for example, is "cute", and sure, the grafitti is gone from the walls, but so are the people who used to live there. In fact, you blame Laramie Plaza for a lot of the problems the Lower West Side has had since the "yupification" of Laramie Plaza forced many of the "undesirables" who used to live there into your neighborhood. While the Lower West Side hasn't made you rich, you are committed to the area, and would like to see any new developments priced within the reach of all people.

e. Mayor Ramona Sanchez- As mayor, you are deeply involved in the redevelopment of the Lower West Side. Motivating you are several things. You have been personally stung by charges that yours has been a "do nothing" administration, and you see the LWS Project as something which can quell those complaints, and leave your stamp on the city. You are also sensitive to the charge that Revned is a city without a real focus or identity of its own. Too, in a recent "places rated" publication, Revned was ranked way down the list of major metropolitan areas. In fact, Revned was far behind places like Pittsburgh, and only one step ahead of Cleveland! Perhaps a major success with the LWS Project will salve your own and the city's wounds. Complicating the issue is the fact that the Lower West Side is a heavily minority area community (and quite poor). Also true is that the solid support of the minority community was instrumental in putting you behind the mayor's desk in the last election. The people of the Lower West Side are looking to you for help.

2. Each member of the group should select three land uses he/she considers appropriate for the Lower West Side according to his/her role. This will be done individually. Possible land uses include: a) offices; b) private housing (single family or multiple units of various sizes and styles); c) parks/open space; d) commercial (shops and stores); e) public housing; f) industry; g) hotels; h) entertainment facilities (e.g. amusement/theme parks, sports stadiums and facilities, convention hall, museums, theaters. . .); i) parking lots.

3. Each individual will select six of the areas delineated on the "Lower West Side Area" map (Figure 1) as appropriate places for the three land uses he/she has selected. In looking at the map, it is important to remember that the ultimate land use (after redevelopment) is not necessarily related to the current land use. However, current land use may provide ideas and/or resources to be used in redevelopment.

4. Planning Meeting- Redeveloping the Lower West Side Acting in their roles, the five students in each group now meet to decide on the land uses for all 13 areal units on the base map. Each group will prepare a "Proposed Land Use Map for the Lower West Side" using a blank base map (you may wish to have this student map prepared on a transparency to facilitate class discussion later on). Students will use colors and/or symbols to differentiate the various land uses, and will prepare an appropriate key. Students should be alert to the decision making process in their group. Were "deals" arranged, compromises reached, or even threats employed?

5. Task Force (group) Report- Each group will prepare a combined oral/written summary of their plan to the City Council (Class). The City Council has the power to approve one of the plans which is presented to it. The Task Force will include:

a. the completed plan in map form;

b. an oral description of the map plan to the group has devised;

c. an oral justification of the plan citing the reasons behind it;

d. brief oral comment from each group member describing the degree to which he/she is satisfied with the plan;

e. a written paragraph from each member of the group describing their role in the group's activities, analyzing (strengths and weaknesses) the position and effectiveness of their particular role in the group process.

f. a written paragraph from each member of the group (in their role) describing their degree of satisfaction with the group's plan and the reasons behind their position.

6. The City Council (class) determines which of the plans it prefers. (Note to teacher: you may wish to forestall conflicts of interest by not allowing students to vote for their own plans. After the initial vote, you may want to have a final vote between the two highest vote getters to determine the ultimate winner.)

7. Evaluation of the Plan - Who Benefits?

As a stimulus to or in conjunction with a class discussion of this question you may have students fill in the following matrix using this scoring system:

Very beneficial = 2 points; Somewhat beneficial = 1 point; not beneficial = 0 points

The following questions may be used to guide discussion:

a. Who are the two highest scoring groups? How does the plan benefit them?

b. Who are the two lowest scoring groups? What criticisms would they make of the plan?

c. Why were these groups unable to get the developments they would have wanted?

d. Why were the highest scoring groups able to get what they wanted?

e. What changes could have been made to increase the scores of the two lowest groups? Are these changes likely to be made?

f. Would your group's plan have been a fairer one? In what ways?

g. Does the plan adopted by the class favor "yupification?"

8. As an extension to the lesson, some or all students could go beyond putting land use categories on the base map by creating more detailed plans for the LWS. These would presumably be done at larger scale, and could include such things as street/path patterns, and diagrams incorporating the location and design of renovated and/or new buildings, parks, etc., which the student envision.

9. Another extension would be to review urban renewal/gentrification plans in Denver (Larimer Square, Market and Blake Streets, the convention center, etc.) or other cities.

In summary, this lesson requires students to have some background knowledge of urban form and function. They should be able to answer questions like: 1) By looking at the map of the Lower West Side, tell what zone of the city this is, and give a general description of how it got this way; 2) Describe the probable social make-up of this region of the city, and the likely course of events which led to this situation; 3) Predict what kinds of social and physical regions would be found marginal to the Lower West Side.

Based on the lesson itself, students should be able to define "gentrification" and/or "yupification", and tell why this phenomenon occurs where it does. They will be able to discuss some of the forces and conflicts involved in this type of intra-city change. Beyond that, however, students will be able to address the "so what" behind this kind of change. This is something we as teachers must not slight. It's not enough to be able to describe and analyze geographical patterns and changes. We, and our students, must be alert to their human causes and consequences. If one of our goals is to promote a better understanding of the world around us, with a view toward creating a better world in the future, then this sensitivity to the human elements of geographical pattern and change is of utmost importance.

THE RATING GAME

SENIORHIGH

Cities like Denver are part of a larger system of cities, and as such, part of regional patterns of growth and decline. The ability of a city to sell itself, its "public relations" skills, plays a part in determining how it fits in this regional pattern. Is the city a winner or a loser? This "urban scorecard" or "rating game" contains many disparate variables. For example, does a Bronco's loss presage a loss of vitality for the city of Denver? Colorado's governor certainly is not hesitant to use a football team to pump-up a city's and a region's economy. Any individual's or group's decision to move from one place to another is a kind of rating. Decisions to relocate are based on many variables, some objective, some subjective, some peculiar to the individual who is moving.

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The "ratings game" has become popular recently by the Places Rated Almanac by Boyer and Savageau (Rand McNally, 1981, 1985). These ratings devices generate tremendous interest and many people take them seriously. These books became the subject of talk shows, editorials, quasi-news programs, mayoral compliment or diatribe, and much fascination on the part of individuals. Ratings play upon our inherent interest in lists and rankings and our sometimes perverse desire to see if our own or someone else's ox has been gored. A high ranking boosts civic pride and a city's image. A low rating can lead to civic trauma and an identity crisis. For example, an official of Yuba City, California proposed a book burning in the center of town (after his town placed dead last in the 1985 Almanac. Tulsa, Oklahoma sued a political science professor for $26 million for defaming their city in another ranking scheme.

Cities have good reason to be concerned over these ratings. We live in an era of extraordinary mobility, in which more people than ever before are able to base decisions as to when and where to move on a wide range of "quality of life" considerations. This applies not only to individuals and families, but to corporations, and even entire industries. As less and less of our economy is tied to primary economic activities and to smokestacks, both investments and labor are free to move. If, say, Phoenix or West Palm Beach received devastating ratings in a popular "guide," what might they have to do to offset this blow to their image? On the other hand, could the number one city (Pittsburgh in the 1985 Places Rated Almanac) have purchased for any price, the amount of positive public relations that followed that ranking?

What about the rankings themselves? For the Places Rated Almanac, suffice it to say that none of the assumptions upon which its ratings were based, including the variables chosen, and the data used to illuminate those variables, came down from the mount carved in stone. Many of the variables contain built-in biases toward cities of particular sizes. Too, much of the data manipulation could have been done in other, equally valid ways, which would have yielded different results. (For a discussion of Boyer and Savageau, other current ratings systems, as well as something of a history of ratings efforts, see Rating Places: A Geographer's View on Quality of Life, by Susan L. Cutter, Association of American Geographers, Washington, D.C., 1985. Cutter analyzes what ratings system should do from the perspective of the geographer, and points out that recently, geographers have begun to make forays into this popular realm.)

In spite of many shortcomings of the Places Rated Almanac, it remains a wonderful pedagogic device. It can be used in activities that relate to all five of the fundamental themes of geography found in Guidelines for Geographic Education. "Place," "Location," and "Relationships within Places," are literally components of the book's analysis of cities, while "Movement" and "Regions" never lurk far from the surface, just waiting to be drawn into the light by teachers and students. Whatever one may think of the ratings, the book itself is a massive compendium of information on a lot of different places! What follows are some ideas for activities that lead into a consideration of places and ratings.

Activities

1. Create state preference maps. Give each student an outline map of the U.S. with state boundaries, but no other information. Have students rate the states as places to live on a scale of 1 to 10, with 10 being the best state and 1 the worst. Options would be to rate states for vacation potential, or even to rate states for people in age or economic brackets other than their own. Students can do this individually, but by working in small groups they will often generate some interesting exchanges of perceptions, information, and misinformation. Once the states have been rated, students may attempt to describe the patterns (regions) of their preferences. An easy way to do this is to have students color quintiles of ratings (states rated 1-2 red, 3-4 orange, etc.). A greater challenge is to have the students create isopleth maps similar to those in Spatial Organization by Abler, Adams, and Gould.

In discussion, you can try to determine the reasons for the students' preferences, and to draw out contradictory perceptions which may exist among your students.

This activity encourages discussion of the nature of place. What are the physical and human characteristics of the states that led to the ratings. Region can also be brought in—are there identifiable clusters of states with similar preference ratings? What might be the common characteristics of those states? Do they thus form a region?

Variation in students' maps can be used to illustrate the role of individual perceptions, as opposed to objective data, in the evaluation of place. (Another by-product of this activity is the reinforcement of state and name recognition: students must name the state to rate it.)

2. The next step might be to do a preference ordering of a list of cities. I would suggest using large cities of the U.S. that the students might have some knowledge of, or would have at least heard of. Simply list 10 cities to be rated best place to live down to the worst. Again this can be an individual or group activity. Be alert to the kinds of "information" being used to do the rating. Some students may have visited or even lived in some of these cities. Others perceptions may be based on nothing more than a popular "cops and robbers" TV show, or dislike for a football team.

Class discussion can again focus on the nature of place, the human and physical characteristics of these cities, and on the ways we develop our perceptions of different places. You may have students locate the cities on their state maps, as a reinforcement of location.

(An extension of this activity would be to compare the student rankings of the cities with the rankings of the Places Rated Almanac. How were the rankings similar or different? Analyze the criteria used in each case to get the respective rankings.)

3. Activity 2 involved clarifying the nature of place and the perceptions we hold about places. The third activity, a brief one, asks students to brainstorm the important characteristics of places. Given the clues that places have human and physical characteristics that can be tangible or intangible, and drawing upon the state and city preference activities, students should be able to come up with a wide array of characteristics. Questions that may be posed at this juncture might include: Will your list of important characteristics be the same when you are 35 years old? at age 70? Why or why not? What might the differences be between a residence and a vacation place? What characteristics will an unemployed steelworker in Youngstown, Ohio, consider important? A 65 year old widow?

4. The heart of this sequence of activities involves student analysis of the same data used by the Places Rated Almanac. Present the students with data drawn from the book for 10 metropolitan areas. Again I like to use groups of students. A class of 30 students which would yield groups of three for later parts of this activity. The cities are not named in order that preconceptions are minimized. (I have also discovered in activities like this that the mystery generates a lot of suspense among the students, and maintains a high level of interest as they try to figure out which cities they are dealing with. To maximize this suspense, have each group become the Chamber of Commerce of one of the cities as they try to lure a new factory, or prepare a presentation to the Places Rated staff.) Students look over the nine categories of information and then rank the cities based on their evaluation. A 9x10 box evaluation matrix would help the students

in this evaluation task. The data can be taken from the Places Rated Almanac. Some camouflaging must be done to preserve the anonymity of the cities. The groups of students reach consensus on their ranking of the 10 cities.

A different tack would be to give the students a list of cities and have them find the place characteristics of each city using the Places Rated Almanac. An advantage to this approach would be that as students discover information about places, they tie those data specifically to a particular city. They would realize that, say, it is the climate of Chicago (rather than a "mystery" city) that has these characteristics.

5. After the groups of students reach an internal consensus, the entire class discusses their findings and attempts to reach consensus. In this process a lot of discussion will center around the relative importance of the variables they have examined. Some students may value a short winter and dry climate more than the number of theater companies or symphony orchestras a city has.

6. Since there are opinions about the relative importance of the nine place characteristics, a logical step is to weight them. (In spite of this logic, the Places Rated Almanac does not do this.) A simple way to do this is to have the students rank the categories in order of perceived importance. The most important would get 9 points, the least important would get one point. Students can then multiply the ranking of the variable times the ranking a city got on that same variable. Thus, a city that ranked highest (10) on the most important variable (9), would get (10x9) 90 points. The worst city on the least important variable would get (1x1) 1 point. This is a crude method of weighing the data in order to increase its relevance and degree of reality. Compare the rankings of the 10 cities after the variables have been weighted to their rankings before, to determine the degree to which the weighting process changed the ranks. This is a simple example of how statistical manipulation can affect the nature of ratings.

7. At this point, as an optional activity, the teacher may wish to run the "Chamber of Commerce" part of the activity mentioned in activity 4 above.

8. Assuming you've used the "mystery city" approach, at some time or another you've got to unveil the cities. Having ranked and now named the cities, the students can perform a comparison/contrast with the rankings given the cities by the Places Rated Almanac. This activity will undoubtedly be accompanied by choruses of "I told you so!" and "They've got to be crazy!"

THE 'WHERE' AND 'WHY THERE' OF GEOGRAPHY IN THE K-12 CURRICULUM

A PLACE FOR GEOGRAPHY

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Geographic education can satisfy our deep need to know about other people and places, the natural environment, the capacity of the earth to support human life, and to inform our own individual perceptions of places. Thus geographic education requires knowing *where* things are located, but more importantly requires a system for inquiring *why* they are there and*where they should be* .

Guidelines for Geographic Education

Geographical education occurs at the intersection of the discipline and the classroom, where the student and the teacher interact with each other and with geography. Ideally, students and teachers, will reach into the curricular container and browse, explore, and absorb geography as a result of raising questions that have specific, plausible, or completely hypothetical solutions. "Where?" and "why there?" are two big questions they should be asking. In this paper, I use those same two questions, but not in the context of the discipline per se, but rather to address the articulation of geographical concepts into the school curriculum. As geographic educators who are working to enhance the role of K-12 geography, it is important to address curriculum design because that is what places geography within the perspective and intellectual reach of the student. Curriculum design in geography requires knowing *where* the study of fundamental themes of the discipline are introduced and developed , and being able to rationalize *why* it is *there* .

The "fundamental themes" from the Guidelines for Geographic Education[1] provide the framework for the discipline. The curriculum provides the placement and sequence for the development of the concepts, content, and skills that emerge through the themes. Both processes require the questions "where?" and "why there?"

Articulating Geography Within the Curriculum

The curriculum term that identifies the social science disciplines in the K - 12 grades is the social studies. That is a statement of fact, based upon two compelling reasons. First, the literature written by professional educators, including the highly influential elementary and secondary level textbook series, refers to the curriculum as the social studies. Second, teachers across the country use the terminology of social studies when they discuss curriculum issues. This is particularly true in the K - 6 grades, but also largely the case in the secondary grades.

The social studies curriculum is guided by a scope and sequence model. The model addresses the two critical questions: "Where" are designated topics of study and their underlying elements of content, concepts, information, and skills to be placed in the K - 12 curriculum?; and, "Why" are those topics placed "there" in the K - 12 curriculum?

The most widely recognized scope and sequence for social studies education in the United States is the 1983 Report of the Task Force on Scope and Sequence of the National Council for the Social Studies.[2] It is shown on Figure 1. The "where" question is answered by comparing grade levels with the topical focus at each grade. The "why there" question is not so easily reconciled. "Why there?" is the result in part of research in social studies learning, of knowledge about child development (both social and intellectual), and a good deal of what has evolved as the "tradition and culture" of American education. The tradition and culture of the curriculum are based upon a combination of professional judgment, upon principles of psychological development and upon norms that reflect social groups. Each of these is especially important to the "why there" question. Generally speaking, topics that are spatially, temporally, or psychologically close to the learner have been included early in the social studies program. Those further removed from the student in space and time tend to be included later. This view has been altered somewhat with the advent of mass communications, especially television, that have reduced the size of the earth along both space and time dimensions.

Figure 1. National Council for the Social Studies: Scope and Sequence

GRADE	FOCUS
K	Awareness of Self in a Social Setting
1	The Individual in Primary Social Groups: Understanding School and Family Life
2	Meeting Basic Needs in Nearby Social Groups: The Neighborhood
3	Sharing Earth Space with Others: The Community
4	Human Life in Varied Environments: The Region
5	People of the Americas: The United States and Its Close Neighbors
6	People and Cultures: The Eastern Hemisphere
7	A Changing World of Many Nations: A Global View
8	Building a Strong Free Nation: The United States
9	Systems That Make a Democratic Society Work: Law, Justice, and Economics
10	Origins of Major Cultures: A World History
11	The Maturing of America: United States History
12	One Year Course from Electives > Issues and Problems of Modern Society > Introduction to the Social Sciences > The Arts in Human Societies > International Area Studies > Social Science Courses: Discipline Specific > Supervised Experience in Community Affairs > Local Options

Most curriculum planning is carried out by classroom teachers, and they are faced with the problem of defining "why" something is included "there" in the sequence. The presentation first of near at hand and later the far away have been the rationale for the geography included in elementary social studies. The "expanding environments" scope and sequence in the elementary curriculum is the primary example of a tradition. Research has verified that the cognitive development of children, especially the spatial stages sequence of development identified and researched by Piaget and Weil[3] and Stoltman,[4] is complemented by the expanding environment approach in the elementary grades.

In the secondary grades the social studies are a topical much more than a sequential study. The content of the social sciences becomes the main concern. The role for geography in the secondary curriculum is revealed in statements such as this: "Social studies programs have a responsibility to prepare young people to identify, understand, and work to solve problems that face our increasingly diverse nation and interdependent world."[5] However, the ways that geography can contribute to responsibility in a "diverse nation and interdependent world" are often not clearly identified. In articulating geography with the social studies, it is imperative that the concepts, content and skills inherent in the fundamental themes are developed. This is especially true at the secondary level where much of geography once viewed as essential has disappeared as a result of historical changes in the curriculum.

The inclusion of geography within the curriculum cannot be dictated entirely by the social studies scope and sequence at the secondary level. There has been considerable discussion since 1983 regarding the most appropriate scope and sequence for the social studies. This discussion continues unabated in 1987. Despite the inclusion of three alternatives to the 1983 scope and sequence for grades 6 - 12, a series of subsequent, alternative scope and sequence papers have been prepared and published.[6] In nearly all of the alternative scope and sequence statements there is a significant place for the content, concepts, information, and skills related to geography. This is especially true in the K - 7 grade levels, but not quite so obvious in the grade levels 8 - 12. People concerned with geography must promote scope and sequence statements with a strong geographical strand, and discourage any scope and sequence statement that does not have a significant amount of geography as a separate subject or carefully integrated into the social studies at the secondary level.

The social studies have received their share of the recurring criticisms of the educational system in the United States. Much of that criticism has focused upon the scope and sequence through which different subjects are presented to learners. Donald Bragaw[7] reflects upon the problem in the following statement.

> Recent challenges to the way in which social studies is organized and taught today is but another reflection of the need for the profession to seriously evaluate where it has been along the scope and sequence road, and where present day domestic and global imperatives seem to be pointing. To paraphrase Shakespeare, the problem, Dear Brutus, may not be in our scope and sequences, but in our failure to stake out clear and achievable goals for the school area called social studies.

If defining clear and achievable goals has presented problems for the social studies in general, it has been a major problem for geography to define clear and achievable goals within the social studies. Part of that is the result of the dual physical science and social science nature of geography as a discipline. Part is the result of the historical development of geography within the curriculum. A major step towards a clear and achievable structure for geography in the K - 12 curriculum was made in 1984 with the publication of the Guidelines for Geographic Education. The document develops the goals for geography in the curriculum based upon five fundamental themes from the discipline. The fundamental themes represent the "big" ideas in the discipline from which key ideas and learning outcomes for students are developed. [8] The fundamental themes are presented in Figure 2.

Figure 2. Fundamental Themes In Geography

LOCATION: Position on the Earth's Surface

PLACE: Physical and Human Characteristics

RELATIONSHIPS WITHIN PLACES: Humans and Environments

MOVEMENT: Humans Interacting on the Earth

REGIONS: How They Form and Change

The Guidelines for Geographic Education also present a recommended sequence for geography within the social studies. The Guidelines present the argument that geographic education within elementary social studies offers children a unique opportunity to explore their immediate life space as well as the more remote areas of the world. Geographic instruction at the elementary level should be based upon key geographic ideas and understandings as well as the knowledge of stages of children's cognitive, psychological, and social development. The rich and varied life experiences of children should be used as much as possible to illustrate and develop geographic knowledge and understandings. The recommended sequence for the elementary grades is presented in Figure 3.

The spatially consecutive or "expanding environment" curriculum of the elementary grades is not transformed into the recommendations for the secondary school. The recommended sequence for the secondary school is topical, as shown in Figure 3. The topics take on various degrees of specialization and represent a contracting environment as students focus on geographic studies that are closer in time and space.

Figure 3. National Council For Geographic Education: Guidelines For Geographic Education

GRADE	FOCUS
K	Self in Space
1	Homes and Schools in Different Places
2	Neighborhoods: Small Places in Larger Communities
3	Community: Sharing Space With Others
4	The State, Nation, and World
5	United States, Canada, and Mexico
6	Latin America, USSR, Middle East, and Africa
7	State, Regional, or World Geography
7 - 9	> State or Regional Geography (1 sem) > World Geography (2 sem)
8 - 10	> Earth Sciences (2 sem) > Geography of the United States (1 sem)
9 - 12	> Environmental Geography > Urban Geography > Political Geography/Global Geographic Issues > Historical/Cultural Geography > Economic Geography > Problems in Local Geography
11-12	> Honors Course in Geography

As with the earlier scope and sequence, the "where" question for the content, concepts, and information of geography is readily answered by reviewing Figure 3. The "why there" question may be answered only after reviewing the following: research in geographic learning; knowledge about child development (both social and intellectual); and a good deal of information about what has evolved as the "tradition and culture" of American education. A large part of that tradition and culture is the expanding horizons scope and sequence, especially for the elementary curriculum. There is a great similarity between the scope and sequence recommended by the National Council for the Social Studies and the sequence recommended in the Guidelines for Geographic Education. The similarity is especially evident in grades K - 7, shown by Figure 4.

Although there are similarities in the grades 8 - 12, the greater dependence upon specialty subjects such as history or government in the social studies scope and sequence gives it a different perspective from the geographic education sequence. At the secondary level, geography is a loosely conceived collection of courses with a wide range of topics across an equally wide range of grades. Compared to the social studies sequence, the recommended geography sequence lacks cohesiveness in grades 7 - 12. The social studies and geography scope and sequence recommendations for the secondary grades are shown for comparison purposes on Figure 5.

Social Studies Curriculum Planning for Geography

A major question to consider in planning geography in the curriculum is "How does one go about the process of articulating geography into the social studies?" There are four steps that must be addressed when considering the question of social studies and geography in the K - 12 curriculum. They are:

> Identify the points of greatest opportunity within the social studies for geographic education (Where?). As a social science, geography brings a specific set of concepts, processes, and issues to the social studies. Those are closely related to and complement many of the elements of other social science disciplines in the social studies. It is important to identify where geography makes a solo contribution, where it makes a duet type of contribution, and where it serves as a member of the social studies symphony. The role of physical geography is a pervasive "where" question. Geography is the only discipline in the social studies where attention is given on a systematic basis to the physical environment. That role must be and is preserved within the fundamental themes. At the secondary level it is common to find a general or earth science offering in which geomorphology, biogeography, and climatology make a large contribution from geography. The geographic elements of the earth or general science is generally found within the physical science curriculum. However, it must be noted that geography is one of the few places in the social studies curriculum where the integration of earth science and society takes place within a discipline.

> Select fundamental themes that provide the greatest benefit to learning at that grade level in the social studies and sciences (Why there?). The fundamental themes in geography must be selected based upon a topic and concept analysis of the social studies scope and sequence for each grade. Although each of the themes is important and will probably be included to some degree, it is possible to identify themes that are the focus at a certain grade. Those themes will complement the curriculum and enhance the geography included. The potential of geography to incorporate the human aspects of science and society within the physical science curriculum is a strong argument for articulation.

> Select the key ideas from the fundamental themes that enable the development of knowledge, values, and skills to be clearly identified and tied to the classroom (Why there?). Within each of the fundamental themes are key ideas. In keeping with the learning theory that big ideas must be divided into smaller ideas for the learner to grasp and incorporate within a cognitive structure, each of the fundamental themes has three key ideas, as shown in Figure 6.[9] The next step is to write learning outcomes that may be developed from each key idea. While many learning outcomes will focus upon content, concepts, and skills, the question of values is important, but rests principally with the teacher to develop. An environmental ethic may be one of the outcomes from the key idea that "relationships within places include how people depend upon their environment." As a result of studying geography the students will develop a value system related to the environment, it uses, and its qualities.

Figure 4
Scope and Sequence Comparison
Grades K-7

NCSS SCOPE AND SEQUENCE		NCGE SEQUENCE	
GRADE	FOCUS	GRADE	FOCUS
K	Awareness of Self in a Social Setting	K	Self in Space
1	The Individual in Primary Social Groups: Understanding School and Family Life	1	Homes and Schools in Different Places
2	Meeting Basic Needs in Nearby Social Groups: The Neighborhood	2	Neighborhoods: Small Places in Larger Communities
3	Sharing Earth Space With Others: The Community	3	Community: Sharing Space With Others
4	Human Life in Varied Environments: The Region	4	The State, Nation, and World
5	People of the Americas: The United States and Its Close Neighbors	5	The United States, Canada, and México
6	People and Cultures: The Eastern Hemisphere	6	Latin America, Europe, USSR, Middle East, Asia and Africa
7	A Changing World of Many Nations: A Global View	7	State, Regional or World Geography

Figure 5
Scope and Sequence Comparison
Grades 8-12

NCSS SCOPE AND SEQUENCE		NCGE SEQUENCE	
GRADEFOCUS		GRADE	FOCUS
8	Building a Strong Free Nation: The United States	7-9	State or Regional Geography; World Geography
9	Systems That Make a Democratic Society Work: Law, Justice and Economics	8-10	Earth Sciences; Geography of the United States
10	Origins of Major Cultures: A World History	9-12	Environmental Geography; Urban Geography Political Geography/ Global Geography Issues Historical/Cultural Geography
11	The Maturing of America: United States History		
12	One Year Elective Issues and Problems of Modern Society Introduction to the Social Sciences The Arts in Human Societies International Area Studies Social Science Course Discipline Specific Supervised Experience in Community Affairs Local Options	11-12	Honors Course in Geography

Figure 6. Key Ideas for the Fundamental Themes of Geographical Education

Location

Location of places can be described using relative terms.

Location of places can be described using reference systems.

Reasons can be identified for the location of places.

Place

Places have physical characteristics.

Places have human characteristics.

Places may be described or represented in different ways.

Relationships Within Places

Relationships within places include how people depend on the environment.

Relationships within places include how people adapt to the environment.

Relationships within places include the impact of technology on the environment.

Movement

Movement demonstrates interdependence.

Movement involves linkages between places.

Patterns of movement involve people, ideas, and products.

Regions

Regions are a way to organize information.

A region has common characteristics.

Regions change.

> Design learning outcomes that benefit the learner in citizenship transmission, competence with social sciences, and reflective inquiry (Why there?). Designers of geography in the curriculum must recognize the traditions of the social studies. They are: 1) citizenship transmission, social science disciplines, and reflective inquiry. Learning outcomes, or the ways in which the curriculum assists in the intellectual, affective, and skills development of the student, must be tied to those traditions. "Why" is a specific learning outcome expected as a result of studying geography "there" in a curriculum sequence? In addition, what is its contribution to the geographic pattern in the social studies fabric? Following are two examples of topics from the social studies scope and sequence where the fundamental themes in geography could make a major contribution.

The first example is the study of the community, the topic at the third grade level for most social studies curriculum sequences. Returning to the suggestions for articulation, the overlap between the social studies scope and sequence and geography may be analyzed. The recommended topic for the third grade is described as follows with the terms related to each fundamental theme identified.

Example 1 - Sharing Earth Space With Others: The Community.[10] A content and concept analysis of the NCSS scope for the social studies in the third grade was completed with particular reference to geography and the five fundamental themes. The following paraphrase of the scope statement highlights the geographic elements.

The main focus at grade three is the space that the community offers people and the ways in which that space is shared and jointly occupied. As with the second grade, the concepts of production, distribution, communications, and transportation have applications within geography. The community is presented as a specific place in a larger global setting, with connections of various kinds extending out to other places. In some ways, the local community is dependent upon other places for various items, and at times the relationship between the community and other places is one of interdependence, extending from local to national and international levels.

A concept analysis of the recommended social studies coverage reveals the degree to which the fundamental themes in geography are included as major and minor components of the scope statement The major focus includes the theme of movement and location. The focus upon place, region, and relationships within places (people and the environment) is not major, but considerably greater than a minor focus. Figure 7 shows how the content/concept analysis of the scope statement identifies where articulation of geography in the curriculum is currently strong and where it must be developed.

Figure 7. Fundamental Themes in Geography:
The Study of the Community (Grade 3)

MAJOR FOCUS	MINOR FOCUS
Location	
Specific	
Other	
	Place
	Specific Places
	Other Places
	Production
	Relationship Within Places
	Space Shared and Jointly Occupied
Movement	
Distribution	
Communications	
Transportation	
Connections	
Interdependence	
	Region
	Local
	National
	International

Although each of the fundamental themes is utilized to support the study of the community, it is the theme of movement that receives the greatest attention. In articulating geography at the third grade, it would be of value to place emphasis on movement, and provide examples of location, place, relationship within places, and regions to complement movement. This recommendation for articulation is based upon the scope and sequence recommendations at third grade for the social studies. Note that Figure 7 presents an analysis of the NCSS scope statement. It demonstrates not only the degree to which the fundamental themes are articulated at that grade, but also the themes that require additional attention in the curriculum.

Example 2 - Grade 10 Origins of Major Cultures: A World History.[11] A content and concepts analysis of the NCSS scope statement for this grade level suggested the following. The geographic elements are highlighted.

The geographic component of this course includes learning about the major cultures and societies in the contemporary world. Perspectives should be provided on major world events and movements. Attention should be given to the historical differences among people that lead to conflict. The course is primarily history, but incorporates related concepts from other disciplines, including geography.

The content/concept analysis identifies where articulation between the social studies and the fundamental themes of geography may occur. It is shown in Figure 8.

Figure 8. Fundamental Themes in Geography:
World History (Grade 10)

MAJOR FOCUS	MINOR FOCUS
	Location
Place Major cultures and societies World events and movements Differences among people	
	Relationships Within Places
Movement Conflict	
	Region

The example of world or global history illustrates the extent to which the significant contributions of geography are often excluded from basic scope statements for the curriculum. Location, relationships within places, and region receive little if any attention. A review of Figure 8 suggests that the fundamental themes of place and movement receive some attention, but none of the fundamental themes receive a major focus in conjunction with world history. In order to articulate geography with the world history course it will be necessary to focus upon such key ideas as location and the important relationships between people and the environment. For example, the location of Venice and the relationships between people and the environment in the Po River Valley were instrumental to the development of commerce and trade. It was commerce and trade that helped move the ideas and products of Mediterranean Europe to other regions of the world. The historical significance of the movement of people along the Great Rift Valley of East Africa resulted in important linguistic patterns binding groups together into regional alliances on that continent. These are only a small sample of how world history benefits from the inclusion of geography as represented in the fundamental themes. The fundamental themes are the big ideas of geography and they have considerable power to help explain historical patterns.

Perhaps the greatest opportunity for articulation of fundamental themes of geography and the social studies is at the fifth, sixth, and seventh grades. At those grade levels the social studies is mainly geography and the fundamental themes are all essential in the development of courses. At earlier and later grades the fundamental themes complement, supplement, and assist with critical information, concepts, and ideas in the development of social studies and social science courses.

In some instances, and perhaps increasingly during the 1980s, a separate geography course is taught in the high school curriculum. Although that opportunity is far less common than at the middle/junior high school grade levels, it must be viewed as an opportunity for the development of the fundamental themes.

Summary and Conclusions

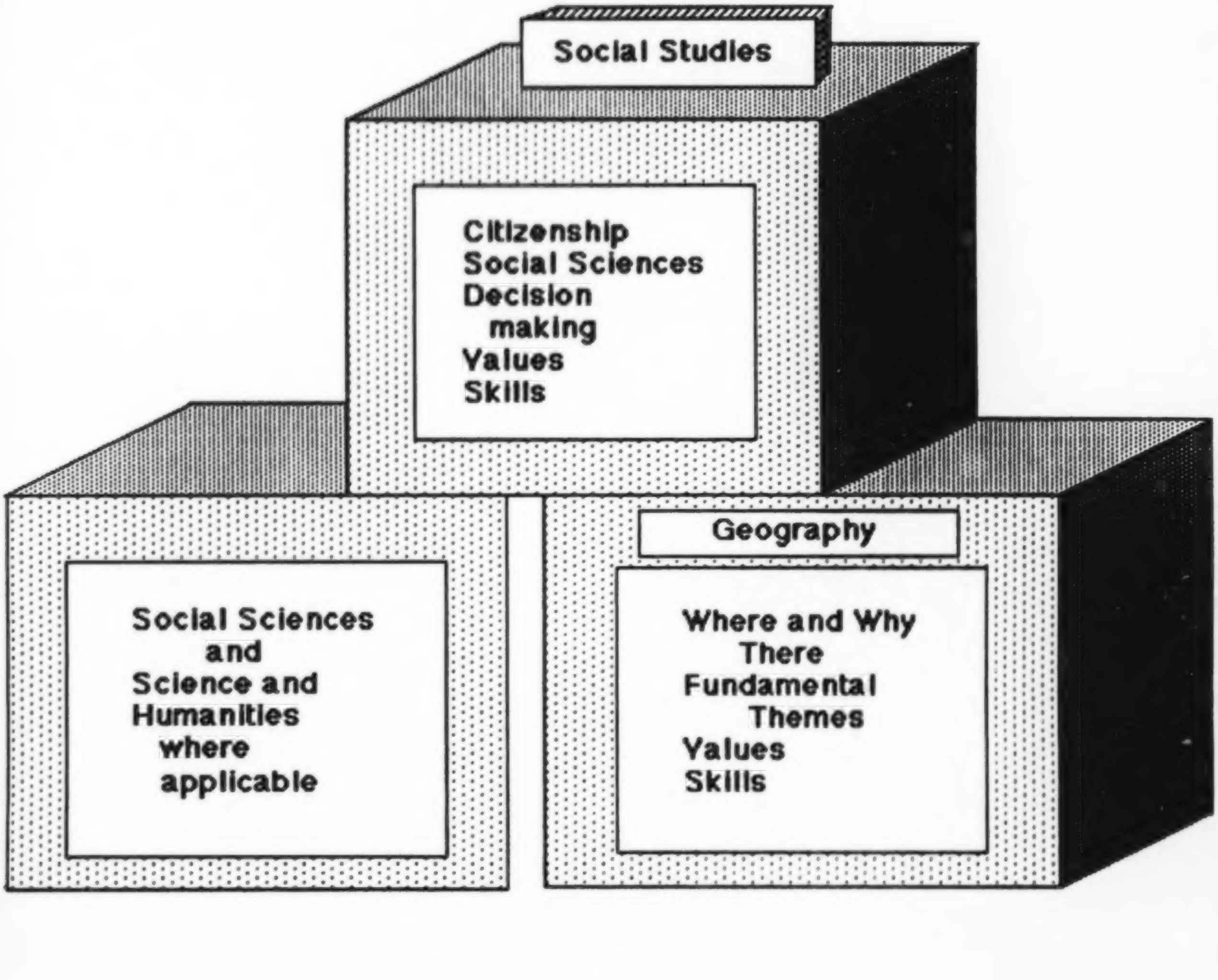
Recognizing that the NCSS scope and sequence presents opportunities and limitations for geography, it is essential that every opportunity be grasped for articulating a geographic component within the social studies. The curriculum at grades K - 4 relies heavily upon geography. Integrating the fundamental themes is possible and practical. The middle or junior high school provides the greatest opportunities. Achieving balance within the fundamental themes is a challenge, since the tendency is to emphasize geographic literacy, which devotes great attention to mere knowledge of place locations. Much more than knowledge of the location of the world's countries and cities is necessary for the development of geographic literacy.[12] A major task in articulation is to identify that niche in the curriculum where the fundamental themes in geography make a qualitatively significant contribution. In some cases it may be one theme that provides the essential focus. In others, all five themes will be essential to develop the geography concepts, content, and skills.

Finally, it is necessary to return to the recognition that geography is one of the social sciences that contributes to the social studies, a role that is perhaps the larger consideration for geography as a discipline, and for the fundamental themes in the discipline. What is the mission of the social studies and how does geography contribute to that mission? The mission of the social studies is in the areas of citizenship transmission, social science , decision making, values, and skills. The contribution of geographic education to citizenship has been well documented.[13] The mission of geography is identified by the "where" and "why there" philosophy, the five fundamental themes, values, and skills. The relationship between the mission of the social studies and that of geographical education is presented in Figure 9. Geography brings the important perspective of space on the earth and the ways that people inhabit and use it. It brings basic skills and values associated with the environment and the cultural diversity that characterizes the earth's peoples. It is essential to the development of a sound and lasting environmental ethic among the people of the nation. It is clear that the mission of the social studies and that of geography are compatible.[14]

As American geographical education enters the final decade prior to the 21st century it has two important responsibilities. One is the analysis and explanation of connections between the United States—its peoples and their ideas and achievements as an economic and social order—and the rest of the world. The other is the connections that geography makes through articulation in the social studies curriculum. Geography's importance and its role in providing knowledge and skills for students and the general public have come of age in the 1980s. As a discipline, it must continue to participate in not only the dress rehearsals, but also the final performances of curriculum articulation within the social studies. Only then will it be possible for the fundamental themes and their related concepts to make their important contribution.

Figure 9

Curriculum Missions Defined for the
Social Studies and Geography


Social Studies
Citizenship
Social Sciences
Decision making
Values
Skills
Social Sciences and Science and Humanities where applicable
Geography
Where and Why There
Fundamental Themes
Values
Skills

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GETTING GEOGRAPHY INTO THE CURRICULUM

Betty A. Grant
Social Studies Coordinator
Pueblo School District No. 60, Colorado
leading a panel with

Henry Staub
Principal, Pecos Junior High School
Adams District 12, Colorado

Phyllis J. Clarke
Social Studies Coordinator
Boulder Valley Schools, Colorado

Ernie Diller, President,
Colorado Council of the Social Studies,
Heritage High School, Littleton, Colorado

Boyd E. Dressler
Supervisor, Curriculum and Instruction
Colorado Department of Education

Remarks of Henry Staub

My remarks focus on the teacher trying to get geography into the curriculum at the building level. Since I have been at the junior high for the 16 years that I've been in education, I'll be coming from that perspective, but I think much of my discussion applies to the other levels. Also, I will be dealing with the departmentalized situation and subject focus.

Pretend that you are a teacher at the junior high level and that you want to get geography into the curriculum, as a class, or as some units in a class, or even expanding it out over years into interdisciplinary approaches at the junior high, elementary, or middle school level. Let's assume that you know what you want to do and district support is available. Now let's discuss three things: (1) How to develop your plan (2) How to involve the principal and (3) How to involve the department chairperson and other key people in the school.

Developing the Plan

Make your plan broad and flexible so that it can be changed and modified as you get input from the principal and other key figures in the school. Have clearly defined goals and outcomes, and tie those goals into the district or school goals and priorities. If you don't, you won't get much support for the plan.

Usually, it will take one to four years to get a comprehensive plan going, so you need to have patience and you need to have the plan outlined for that time span. Emphasizing the plan is beneficial to the students but also to the teachers, e.g., how it will make their job easier, more interesting, more challenging. The same thing with the administration and the community at large.

Begin small, because a little that works is better than a lot that fails. For the first year, you should tackle only one or two units. And if your goal is to incorporate it throughout the curriculum in an interdisciplinary approach, be sure you share units with science or math or other appropriate areas.

Identify all the needed resources—financial, materials and equipment, and personnel. It is especially important to plan for needed inservice and follow ups, such as coaching. Once inservice is done, we sometimes think that's enough, but research shows that getting into the classroom with the teachers is very important. With their permission, help them talk through the process of starting a new project.

Develop a monitoring system that reacts to problems as they come and, at the end of the project, have an evaluation process that shows how far they've come. Lastly, develop a process to involve the staff that builds ownership into the plan.

Involving the Principal

I was asked to observe the NSF geography teachers workshop at CU-Boulder earlier this summer because one of my teachers is a participant. I was very impressed. I was asked to be on a panel at the workshop that did exactly what we're doing here. This is a good example of involving the principal. In presenting the plan to your principal, try to brainstorm with the principal ways that he or she can support the project. Ask him or her to talk about it informally with key people in the building and at various meetings. Ask to speak at those meetings so that you can be involved with presenting the plan. Give the principal the essential data needed to work to support you.

Involving Department Chairs and Other Key People

Identify key supporters and detractors and get their reactions to your ideas before making the plan. Listen well and build in the positive ideas that supporters give you. That will eliminate some problems down the road. Detractors can be of help to you if you ask for it from them and if you incorporate their suggestions. Lastly, be aware that change is difficult for many people. Using a model for change to develop your plan is a good idea.

Question from Audience to Henry Staub

You have discussed how teachers, in their buildings, should proceed in making change. Can your recipe apply to outsiders, perhaps a consultant from a college?

Henry Staub:

I think that the outside-the-building change agent needs to be connected with at least on teacher in the building who knows what is needed. I think change can also come by building relationship with the principal. A teacher in the building can initiate and use the outsider and bring him or her into the process.

Question from Audience to Henry Staub:

What role can you play as a principal in bringing change from your building into the larger system outside your building?

Henry Staub:

In my district, I think the best way to do that would be to talk about the idea with the other district junior high principals. That could be done both informally and in formal presentations. If we had success at my school I'd want to get the involved teacher or teachers to present our program to other social studies teachers and principals in the district.

Remarks of Phyllis J. Clarke

Curriculum changes can come from two ways. One can be from the school, and when something is really successful, it tends to have its own velocity, and continues on from school to school. Pretty soon the district will get involved and it then can become district curriculum. It can start that way or it can start at the top down.

Before embarking on the path to making a change in a district's curriculum you should have a clear rationale for undertaking the task. You need to know the existing courses and whether modification or major change is necessary. Are you advocating a new unit, a few major revisions in an existing course, or a brand new course? If a new course is being proposed, should it be required or elective? It is important to understand the implications of any proposal you might make on graduation requirements and students who are not planning to go to college. The best way to gain necessary information is to review your district's requirements in the Social Studies area. Is it already "heavy"? What proportion of total credits are required and what proportion of total credits are electives? Is there adequate opportunity for students to access courses? The answer to these questions will help you determine whether you want to propose an elective or required course. It is also important to read the descriptions for courses that have a geography core. Would it be possible to modify a course so that it would meet substantive requirements (e.g., the geography requirements at the University of Colorado, Boulder) and still accomplish the goals of the district?

Once you have gathered all the necessary data you will need to evaluate it to find the simplest and most acceptable route for you to propose. You will also need to evaluate the effects your proposal will have on students who are taking college preparatory courses, those completing their education at grade 12, those who are in work study programs, and possible drop outs.

You must substantiate the need for adding or changing a course by showing that there is inadequate or inappropriate coverage of geography in existing courses, and that making the change will not undermine the goals or responsibilities of the district. Course descriptions are often inadequate. To make your case you may need to talk to fellow teachers in order to determine the "real" curriculum in your district.

We all know that sometimes there's a difference between those district objectives that are written down nice and neatly and what's happening in the classroom. Even though we have things on the book that say we're doing lots of geography, in reality we may not be. It may be just as simple as resources. In my own district we had wonderful objectives for geography, but when I went out and surveyed the classrooms, I found that we had no resources. So teachers weren't teaching geography. I did that as a curriculum person, but a teacher was the one who tipped me off that they had nothing to teach with. That started the ball rolling, so it could be that you just need to say - yes, we have some things on the book but let's make some changes and we can get the resources.

In order to gather information, your first stop should be at the office of your Social Studies Coordinator. If you don't have one, then check with the Curriculum Director or Office of Instruction. Let them know your concern and ask for copies of guides, graduation requirements, and course descriptions. Don't expect them to do the data gathering for you. If they do the work, they will be the ones with the information and you will have to defer to them or need them to attend every meeting in order to be sure of your facts. If you work with the coordinators, discuss the facts with them, and include them without expecting them to do all of the preparation for you. They can be your greatest ally.

Once you have gathered the data and analyzed it, you need to develop a plan. It should include specifics such as whether the change is the inclusion of a unit, a name change, a new course, etc. It should also indicate the grade level to be affected, the resources and their source. Any plan should include a rationale for change, modification, or a new course, and the implications of that change for teachers, students, and the district.

Having worked out a feasible plan that has the support of the coordinator or curriculum director, you need to make sure you also have the support of most of the teachers who would be affected by your plan. Are teachers going to be asked to plan a new course? If so, what costs will be involved? Will teachers be required to give up teaching a favorite course? Know the costs and implications for the future of the actions you are requesting.

Human, financial, and supporting resources need to be available for your proposed modification or addition. Check with other districts that have a similar course and with members of the Geography Alliance for materials to support your plan. Have a prepared list of several sources that have a proven success rate.

If you have been working with a Curriculum Director or Director of Instruction, the next move will be up to that director as to whether your proposal has merit to be taken to a higher level. If you have been working with a Social Studies Coordinator, the next step would be to approach the Curriculum Director with your proposal. Do this through the Coordinator. Ask the coordinator to set up a meeting with the Curriculum Director and ask if you can be present. A one-page description of your proposal should be presented and left with the Curriculum Director so that they can review the information you presented after you leave. In summary, here's a list of Do's and Don'ts:

DO'S

1. Have a clear and powerful rationale for your request.
2. Know what courses already exist and the strengths and weaknesses of the program.
3. Evaluate the consequences of your plan on students and teachers.
4. Go through the appropriate contact for your district.
5. Make sure there are resources to support your plan.
6. Write a one-page description of your proposal. Keep it simple.

DON'TS

1. Don't ask for changes that are not in your districts best interest.
2. Don't demand a course or change without knowing the implications of such an action or if a course is already in existence.
3. Don't start at the community level and come to the Board of Education demanding that something be done without going through the appropriate channels.
4. Don't decide for your colleagues. Get their support and be receptive to the implications for their jobs.

Betty Grant:

I'd like to add to Phyllis's comment about doing your homework. Think ahead of time "how can I structure this course so that a little bit is done every year and everyone can see a measured progress." Then, the change will not simply disappear and we will have it five or six years from now. If you plan like that you will get colleagues' support.

Question from Audience:

Do you expect somebody who proposes something new to offer alternatives?

Phyllis Clarke:

You should have alternatives, especially if you're offering a new course. Subtle changes will be easier. For instance, you might see a way to change a course title, or get the objectives changed. This might not quite meet your standards, but its going to be the easier route.

Comment from audience:

Apparently, social studies curriculum goals and geographic education at the elementary level match pretty well. You can make persuasive case that teacher inservice will help there. At the junior high it's a little bit more difficult, but the real struggle is in high school. You suggest an appropriate tactic: Be persuasive in making a few changes in those curriculum goals and the advance then can be made for geography.

Phyllis Clarke:

You have to think of the easiest way to do this without causing a great problem for the district. The goals are very close and some of the courses are almost right there. You should be able to say: "Look, here are the objectives we already have. This little change, some inservice, and some resources can make a difference."

Betty Grant

My experience in trying to initiate change on a building level or a district level is that you get hit with two questions. On the building level: What is it going to do to the schedule? And on a district level: Where are you going to get the money? The Colorado Council for the Social Studies is going to help answer the second question. Ernie Diller is here to tell us about CCSS.

Remarks of Ernie Diller

Colorado Council for the Social Studies is a non-profit corporation. Its purpose is to support educational work. This includes the coordination, promotion, development, and maintenance of quality social studies programs at all levels of educational; instruction in Colorado. CCSS is affiliated with the National Council for the Social Studies. Membership is open to certified teachers, professors, school administrators, and other individuals whose formal training or interest is in a discipline of the social studies. The present membership is over 350 members.

CCSS publishes four newsletters a year. These provide up-to-date information on local workshops and institutes, new materials, and teaching activities. CCSS also sponsors the Rocky Mountain Regional Social Studies Conference every two years and other special interest workshops statewide. Currently CCSS offers $250 grants for teachers to develop programs. Colorado Council for the Social Studies is here to promote social studies education and to help you bring geography into your classroom.

Remarks of Boyd E. Dressler

Public education as we know it today, will not exist in the year 2000. The world is changing at a rapidly increasing rate. Our education system and the processes we currently use to help young people learn will have to change significantly. If not, the function of education will be assumed by others, e.g., private schools, business, and industry. It is happening today. The largest "university" in the world today is the United Auto Workers and General Motors. More than 90% of all adult training is occurring in the business world.

You are here today because you are interested in geography and know full well how important it is in understanding the world. I won't reiterate that importance. I want to place learning, including learning about geography, into perspective with the events, issues, and concerns that confront our society and profession. In addition, I will offer some ideas regarding how to impact the education system as people interested in teaching geography.

According to John Goodlad, the author of A Place Called School, learning is the responsibility of each individual person. Schooling shows society's concentrations on the learning process; education is a social responsibility. Therefore, the first perspective I offer is that each of us is an educator. We not only have the right and duty to place people into office, such as on a board of education, but we have a right and obligation to contribute to the formation of policies that guide the activities of that organization, such as a school. In contributing to policy formation you don't need to be an expert in curriculum development or assessment, nor do you have to be involved with the schooling system to be aware of what is happening in the world. You have ideas of what is important to learn in order to cope and thrive, and those ideas can impact the educational system.

The second perspective I want to offer centers on the changing nature of our world. It wasn't too long ago that new information came to us at a pace that we could tolerate. The amount of information turned-over about every 48 to 60 months. That is, it doubled over a 4 to 5 year period. Within the next 3 years the amount of new information will turnover every 39 weeks, the length of one school year. There is simply too much information to assimilate to reduce it to mere memorization. People must develop higher order thinking skills. There is no question that we will still need to know facts, places, events, people, etc., but people will have to learn to identify problems, issues, causes and effects, and relationships; they will have to analyze and to project beyond the limits of space and time in order to grasp a complete understanding of any event. Knowing where the Straits of Hormuz is located is not enough. Knowing why that geographic point is important. . . politically, economically, and culturally is important because it develops the complete picture of the region, the people, what is happening and what might happen in the world .

Here are some ideas to consider. First, get to know your education system. Know the people, what they do, how decisions are made, and who the key people are in the decision making process. Often times, for example, decisions are made in the local coffee shop and validated at the board of education meeting. Find out what is happening in classrooms regarding the teaching of geography. How much do teachers at all levels teaching all disciplines really know about geography? Develop suggestions for introducing geography concepts as ways of enhancing other subjects. Geography can be involved in math, social studies, science, reading, writing, art, music, and economics, and vice-versa. Develop community resources that can be utilized to enhance learning including learning about geography. Senior citizens who have traveled extensively or who have lived in other locations or who are natives of a given locale would be invaluable resources in helping young people see the world, see the changes that occur over time in a given community: "Why, when I came here in 1900, that was just a pasture."

Second, develop strategies for helping young people learn how to think. Such strategies may include helping students learn how to contrast and compare (e.g., the Mid-East today and 100 years ago). Develop methods that will help students evaluate information such as the events in the Persian Gulf. Encourage invention and elaboration and projection. Work with teachers as sources of ideas and as resources.

Third, examine ways of weaving the curriculum to promote holistic learning. Stand alone geography classes are very appropriate, but as a geography teacher or as a person interested in geography try to assist all teachers in utilizing geographic concepts and principles to enrich other courses. Schools of the future will be the focus of cooperation between professional educators and community people and business and industry in enhancing learning for people of all ages. As geography teachers and advocates we must strive to be sure that people understand the world in which they live. That knowledge will be increasingly important as the world continues to shrink and we come closer and closer to other people throughout the planet. The land, the waters, the air, the vegetation is our heritage, our home, and our future. The land is where the theater of the world plays and where political, economic, and cultural acts will continue or end in a firestorm. Geographic education provides the appreciation and knowledge that is crucial for our survival. Moreover, we must instill in all people a love for learning, and we must create processes that connect people and expands their ability to actively, knowledgeably, and productively participate in life and contribute to society.

Question from audience:

After parents are informed, then what is their role?

Boyd Dressler:

All teachers are not parents, but all parents are educators. I think we can send things home and say "Here's a follow-up activity that will support this concept."

Betty Grant:

I think that parents can be our best marketing agents when we use them appropriately and encourage them to be part of the system. Parents love to see what the kids do. Display in the classroom and invite parents in. There is no reason why we have to restrict ourselves to displays in the classroom. Shopping malls are good examples. The next thing you know, Johnnie's dad will be asking if his class can come talk to Kiwanis or to the Lions.

Question from the audience:

Why doesn't the State of Colorado require senior high world geography?

Phyllis Clarke:

There is no Colorado state curriculum. The state constitution prohibits the State from mandating curriculum; those decisions rest with local boards of education.

Boyd Dressler:

American History and Colorado history are required. We are now working with a concept to incorporate Colorado history and geography. We are working with the Colorado Endowment for the Humanities; there are not a lot of good teaching resources on Colorado history.

Question from the audience:

Is the new C.U. requirement [of a year of high school geography for freshman admission to the College of Arts and Sciences] having an impact in your district?

Phyllis Clarke:

Yes, It is. A committee looked at how we were going to try to address that. We put in a one-semester elective course, ninth grade world geography. That does not however get at the other half year.

Ernie Diller:

In Littleton we had a survey that indicated that parents wanted more geography in the classroom. We had the parents behind us. Then with the CU requirement, that was just more reinforcement. We're going to have more geography. We now have two electives, cultural and physical geography.

Boyd Dressler:

Ninety-eight of Colorado's 176 school districts have 600 or fewer students. The smallest district has only 33 students. Many of these districts say they are not going to offer it because most of their students either don't go to college, or if they do, they go to CSU or UNC where it's not required.

Betty Grant:

There are some school districts in the state that have manipulated the wording of their courses to fulfill the CU requirements. For example, you could take a semester course in geography, tack it onto another semester course in U.S. History, and entitle it U.S. History and Geography — 1 credit, which circumvents the purpose of the requirement. Higher education mandates of geography don't always help you get it into the public schools. It may not only not help you, it may indeed cause some resistance that you will have to overcome.

Comment from audience:

Henry, how as a principal are you going to respond to parents, who say "I don't think my child is understanding geography," or "I'd like to see more geography in schools."

Henry Staub:

Our district teaches 7th grade geography. I'd like to see geography expand into other curriculum areas in an interdisciplinary approach.

Comment from audience:

I'm that parent. I've listened for your response to my question. My child transferred to your school in the eighth grade and she didn't have geography where she came from and I'm not satisfied. What are you going to say to that?

Betty Grant:

Why can't we have a presentation on curriculum at the P.T.A. meeting. Parents love to see what their kids do. That's why they go to football games, concerts, and plays. Now, let's invite them to come to instruction. I'm sure there are many worthwhile activities to promote geography, but we're out of time. Thank you for coming and thanks to our panel members.

[end]

GEOGRAPHY AS HISTORY: THE INTERSECTION OF SPACE AND TIME

C. L. Salter
National Geographic Society
Washington, D. C.

Wandering on Mount Chung-nan

South Mountain stuffs all heaven and earth,
Sun and moon grow up from its stones.
The high peak at night holds back the sun,
The deep vales are never bright by day.
Natural for mountain people to grow straight:
Where paths are steep and mind levels.
A long wind drives the pines and cypresses
With a sound which sweeps the thousand hollows clean.
Who comes here regrets that he ever studied
Morning after morning, to be close to floating fame.

(A. C. Graham, Poems of the Late T'ang, New York, Penguin Books, 1965).

This poem is from the late T'ang Dynasty in China, written by Meng Chiao in about 810 A.D. It is the product of a short episode in Chinese literature characterized by a deviation from the strict formalism of classical verse. Such a break from tradition allowed for the incorporation of images and language that sounded a chord distinct form orthodox poetry. In the case of the work of Meng Chiao, it resonated of strong landscape imagery.

Why in the world would a talk about geography as history open with an obscure Chinese ode? What is there in poetry that might suggest a union between two disciplines supposedly as distinct as geography and history? Or, what is the purpose in using a poem to express objective social science reality as we try to compare two different fields?

If you feel you can already answer these three questions, then consider the poems you might use to develop my same line of reasoning. If you are not sure why poetry is brought to this forum, listen up and I will try to make clear both the content and the intent of this message on geography as history.

First of all, let me state the two premises of my presentation:

One: Geography and History are part and parcel of the same reality. There is no history that does not have a critical role being played by the physical or cultural geography of the event. In the same sense, landscape without history is an unused stage. It is an empty set that without viewers or players, becomes meaningless. It is silent in the same way that trees falling in an unpeopled forest make no sound.

Two: As teachers, we all possess the capacity to demonstrate the association between geography and history for we are the people who most commonly develop the mindsets of our students. As we teach, as we talk, as we live our public lives, we create potential models for emulation and in that process, we can show that geography and history are part of a single, vital reality.

Let me use Meng Chiao's "Wandering on Mount

Chung-nan" as an example of such evocative association.

"South Mountain stuffs all heaven and earth. . ." The poet's opening line announces the force of setting for his observation. The mountain is not merely an empty stage for him to people, but it is a presence that is total. He believes that the setting must be understood, must be felt, before the reader—or the listener—can begin to make sense of his message. It is this declaration of the presence and power of landscape that places geography at the very outset of a learning experience, whether in poetry, or in life in bleak, desolate, sultry, and verdant all can stand alone as environmental adjectives, but in our minds the meanings of such words are bound with human perception; of preference; of unattractiveness; of accommodation.

So we have more evidence: There can be no geography without history. Their separation is a divorce of convenience—not of realistic observation.

Meng Chiao brings humankind on the stage in his next line:

"Natural for mountain people to grow straight:

"Where paths are steep the mind levels." Here is a more poetic environmental determinism, "Natural for mountain people to grow straight . . ." In this expression of a mountain population's sense of self, we are reminded of the ways in which a folk culture without the habit of high technology and extreme environmental modification tends to give more credit to nature and its forces than do lowland, urban people.

The mountain folk of Meng Chiao's South Mountain cannot help but sense a straightness, perhaps a directness that they see as a point of differentiation form distant, lowland populations. They see this as growing out of a response to the physical setting that has them living ups and downs as they ply their crafts and work their land. Or is it that these uplanders simply see themselves as more straight than others but gracefully hide this positive self-assessment behind an environmental explanation out of courtesy to those who do not share their reality . . . their steep paths? We are not told by Meng Chiao of the intent in this imagery, but we can infer from his words that he sees—society sees—a distinct people living in the hills of South Mountain.

Is this not often the case when we look at a people, an event, even a period, without the artificial trappings of academic divisions? Do we not see the American Civil War as the product of both landscapes and attitudes in conflict? Did not the 1930s Depression and Dust Bowl clearly derive from geographic as well as demographic and economic factors? How can we not say that the entire Persian Gulf crisis has grown out of a conflict among politics, resources, and cultural systems?

Geography underlies every strand of history. We should indicate that weave in our teaching as Meng Chiao does in the peopling of South Mountain. He establishes the environment within which his person—or his people—will make a comment. He sets the stage for our observation of an attitude, a human perspective, and having established a setting of bold stone, deep vales, hidden sun and moon, and steep paths, he gives us the product of geography and history, after introducing one final environmental image that further maps the setting for these people.

"A long wind drives the pines and cypresses

With a sound which sweeps the thousand hollows clean . . ." Again the sense of isolation is sounded by a geographic image . . . a thousand hollows, being swept clean by a wind driving through the pines and cypresses. What does it mean to be settled in a series of hollows, a thousand hollows? Each hamlet becomes a camp of self-sufficient mountain people, linked by demanding pathways, by demanding tradition, and by the commanding wind that sweeps the thousand hollows clean . . . What that really means is that the history of these people is one of independence. It is one of modest, even minimal intercourse with the lowland populations. The tradition of South Mountain folk is one of self-reliance, keen awareness of local resources, and—as yet unstated-diffident suspicion of outsiders, especially outsiders from the lowlands.

Some of you will say that such an assumption is more of an inference than I have any right to make. I am, perhaps, comparing the South Mountain folk with the Moonshiners, or the Hatfields and McCoys of the Appalachian Mountains. But this is simply a sign of how geography and history travel together in reality, and in our minds.

Each of us has a series of not only mental maps of places but mental profiles of peoples who inhabit those places. What do the South Mountain folk and their culture look like? What do Appalachian Mountain folk and their culture look like? What do Colorado mountain folk and their culture look like? Even though the answers are going to be varied, and they will take shape in direct relationship to our own personal histories and literacy, the images that such questions conjure up demand that we observe the connections between geography and history.

Meng Chiao sweeps the thousand hollows clean and then brings us the message that his mountain reverie has intended from the very beginning. With his final couplet, he exposes us to an historical truth that derives from the geography of his South Mountain world.

"Who comes here regrets that he ever studied

Morning after morning, to be close to floating fame." The worlds are divided by this line. Not the worlds of geography and history, but the worlds of the uplander and the lowlander. To Meng Chiao's way of thinking once the lowlander envelopes himself in the thousand hollows, or climbs the steep paths, or witnesses South Mountain stuffing all heaven and earth, he or she can no longer be driven by the same tradition—that is, the same history—that obtained in the literate world below.

The pattern of study, morning after morning, is a history that knows a geography distinct from South Mountain. The demands of Chinese literacy, of the imperial examinations, of enormous memorization chores, and of life-shaping competition for ascendancy in such an urban system. . . those are the demands that must be met if one is to be "close to floating fame," in the Chinese world of the late T'ang Dynasty. These are the very demands that lose primacy in the folds of South Mountain.

Finally, then, in the imagery of Meng Chiao and his welcome to his readers for an exploration of the landscape and the mindscape of South Mountain, we are exposed to the real cultural gap between two places. On the one hand, we see in a direct and significant way the mountain landscape jutting up south of Chang-an, the capital of the T'ang Dynasty. At the same time, we are provided windows into the cultural makeup of the people who live in those heights. The net result of this imagery is to make ourselves play the various roles suggested by the poet. We climb the paths; we stand alone in the winds; we grow straight in our perception of these people for the geography of this scene provides a rich context for making assumptions about the wedding of geography and history.

At the same time, our reaction to the final couplet provokes a tight comparison between the historical geography of the self-reliant mountain folk vs. the historical geography of the ambitious lowlanders.

"Who comes here regrets that he ever studied
Morning after morning, to be close to floating fame."

is the poet's lesson to us; it is the outcome of learning from the landscape of South Mountain. Exposure to those mountain vales will lead to an understanding of the special and idiosyncratic history and traditions of that region's residents. There can be, Meng Chiao is saying, no geography without history.

And that is our thesis; our first premise. In looking at the reality of a scene—any scene—any observant person must realize that no event occurs without touching both the environment and the people involved in such a happening. Let me repeat: There is no such thing as an "aspatial event." If something occurred, it occurred in space. If it occurred in space, it is an event wrapped with the qualities, the elements, and the influences of the environment. That is why there is no history without geography. All events, as has been said many times, occur at the intersection of space and time.

But there was, at the outset of my talk, the positing of not one, but two premises. The second had to do with the role that you, that we, as teachers play. Although we may all be uneasy in acknowledging the truth of our position as "way finders" for the students who pass through our rooms and lives, we cannot be blind to the reality of our influence on their attitudes. Just as it is "natural" for mountain people to grow straight," it is natural for students to observe to learn from, and oftentimes to pattern themselves—at least in part—from the teachers who are such a large part of their consciousness.

That you are here at this PLACE Conference tells me that you at least in part acknowledge this formative role. Your interest in finding a way to improve your teaching skills, and develop networks of access to better teachers and teaching materials means that you have a concern for a more effective professional life. One of the easiest ways to achieve such an improvement is to make certain that you give your students the most realistic worldview as possible. Such a view demands that you show through teaching, through conversation, through assignments, and through thinking that a mantle of influential geography is worn by all history.

To teach history well, you must provide instruction in the geographical elements—the vales, the sun and moon, the thousand hollows, the movement between the uplands and the lowlands—so that the student can see how finely blended are the geographic and historic traditions that have shaped human development.

And to teach geography well, you must provide instruction in the historical realities—the mountain people grown straight, the regret in the heart of traveling lowlanders for their relentless pursuit of fleeting (or is it floating) fame— so that the student may learn what cultural landscapes develop in unique combinations of peoples, places, and processes.

In essence then, and in conclusion, geography IS history. My perspective—and through your participation in the Colorado Geographic Alliance's Western PLACE Conference I feel that it is now appropriate to expand the pronoun to OUR perspective—is that to teach well one must teach life as it really occurs. Educators have learned to organize segments of reality into disciplines because of the enormity of the demands made on us for teaching.

But that expediency must not diminish your honesty in making decisions about how you teach an event.

Events require geography.

Again.

Events require geography.

Just as you could hear of South Mountain and leave with only images of rock and isolation, your learning is enhanced by the introduction of people and human regret. In this sense, life is like such poetry—a wedding of place and people.

Most of you are mountain people. If these vales have made you grow straight, be honest to the essential, the creative, and the instructive union between geography and history.

Teach geography as history and you may even produce a population of students who will love coming morning after morning to be close to your floating fame as someone who truly understands how vital geography is to a comprehension of reality . . . not only in the classroom, but in larger life.

Make your students' only regret be that there is not more time to teach geography as history; to teach history as geography. . . or to teach both as the poetry of human effort and awareness.

THE CENTER FOR GEOGRAPHIC EDUCATION

The Center for Geographic Education (CENGED) was established in 1988 in the Department of Geography at the University of Colorado, Boulder. The purpose of CENGED is to conduct educational and scientific activities that promote and improve geographic education at all levels throughout the nation. Such activities may include, but are not limited to (1) research on teaching and learning processes in geography, the content and significance of geographic education, and the process of educational change related to geography; (2) translating geographic research into educational materials and dissemination of those materials; and (3) conducting international, national, regional, and local conferences, workshops, and other activities that support teacher development and encourage and enhance geographic education. CENGED provides an institutional base, coordination, and partial support for the Colorado Geographic Alliance.

THE COLORADO GEOGRAPHIC ALLIANCE

Established in 1986 with funds from the National Geographic Society, the Colorado Geographic Alliance (COGA) is dedicated to promoting and improving geographic education in the elementary and secondary schools of Colorado. COGA coordinates the activities of classroom teachers, geographers, administrators, and others interested in these goals.

Coordinated by Professor A. David Hill, Department of Geography, University of Colorado at Boulder, COGA has over 900 members. Membership is free and open to anyone interested in promoting geographic education. COGA has no officers and depends upon volunteers who attend Open Steering Committee Meetings to plan future activities. General Meetings are held each fall and spring to present programs useful to geographic educators.

COGA also conducts summer institutes for teachers, curriculum conferences (such as the three-day Western PLACE Conference in Boulder in August of 1987), statewide activities for Geography Awareness Week, and other special programs. COGA supports members in giving workshops at school district inservices and at professional meetings such as the Colorado Council for the Social Studies and the National Council for Geographic Education. To share its work with its members, COGA publishes a newsletter twice a year and runs a clearinghouse for teaching materials developed by its members.

COGA is supported by Operating and Project Grants from the National Geographic Society Education Foundation in support of the Society's Geographic Education Program and its national network of state-based alliances. Other funds for COGA have come from the University of Colorado, the Western Governors' Association, and the National Science Foundation.